



— BUREAU OF —
RECLAMATION



**US Army Corps
of Engineers®**
Albuquerque District

2021 Annual Operating Plan April 1 Runoff Forecast

April 15-16, 2021

Definitions 1.1

- **Native/natural Rio Grande water:** water that comes directly from the Rio Grande Basin
- **San Juan-Chama water:** water imported from San Juan Basin of Colorado River into Rio Grande Basin through San Juan-Chama Project
- **Rio Grande Compact:** agreement between Colorado, New Mexico, and Texas apportioning Rio Grande water between the three states



Definitions 1.2

- Compact debit – results when actual delivery falls below scheduled delivery of the Rio Grande Compact
- Article VII restrictions: restricts storage of Rio Grande water at El Vado when Rio Grande Project storage in Elephant Butte and Caballo is less than 400,000 ac-ft, except for P&P needs or relinquishment credit
- cfs – cubic feet per second (flowrate)
- Acre-foot – volume of water needed to cover one acre to depth of one foot
- Hydrograph – graph of flowrate over time



Definitions 1.3

- MRGCD – Middle Rio Grande Conservancy District
- The City/Water Authority – Albuquerque Bernalillo County Water Utility Authority (ABCWUA)
- NRCS – Natural Resources Conservation Service
- Supplemental water – water leased by Reclamation to augment flows in support of Rio Grande Silvery Minnow as outlined in 2016 Biological Opinion
- P&P – Prior & Paramount lands of the six Middle Rio Grande Pueblos

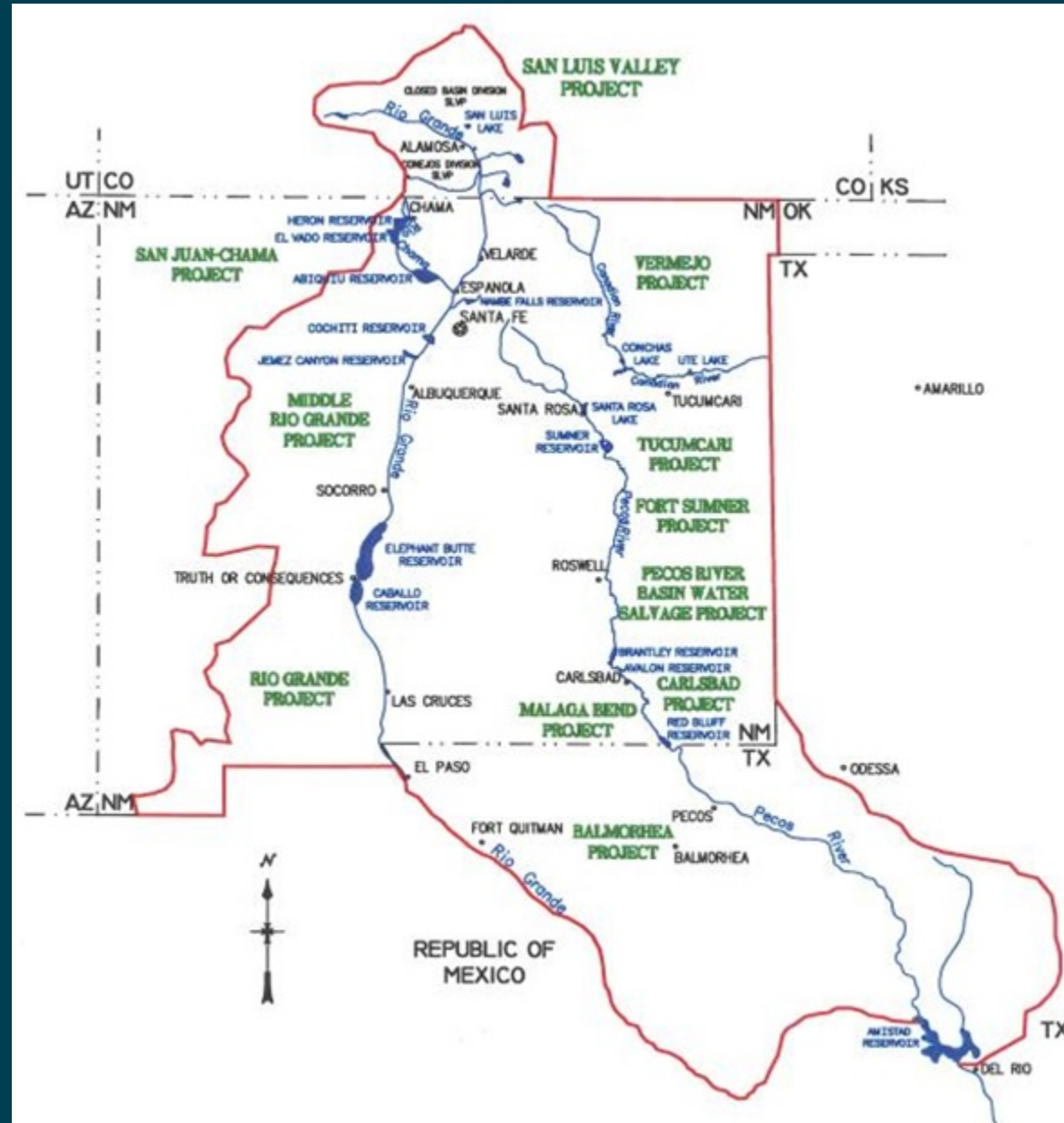


Definitions 1.4

- EBID – Elephant Butte Irrigation District
- EP1 – El Paso County Water Improvement District No. 1
- HCCRD – Hudspeth County Conservation & Reclamation District
- IBWC – International Boundary and Water Commission, US Section
- 1906 Convention – Convention between the United States and Mexico, signed May 21, 1906
- OA – 2008 Operating Agreement for the Rio Grande Project, between EBID, EP1, Reclamation



Map of Reclamation's Albuquerque Area Office Projects

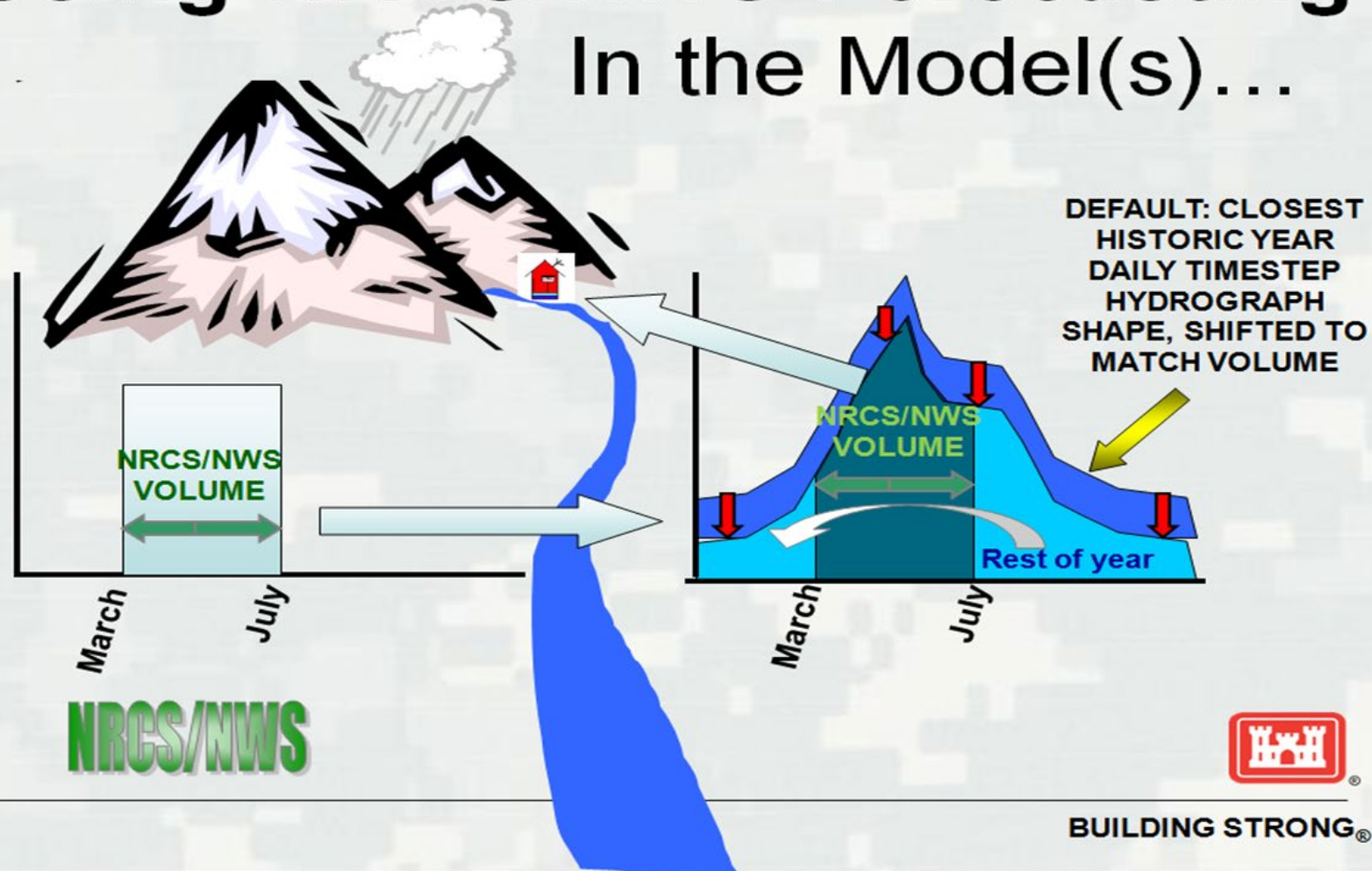


What Drives the Process

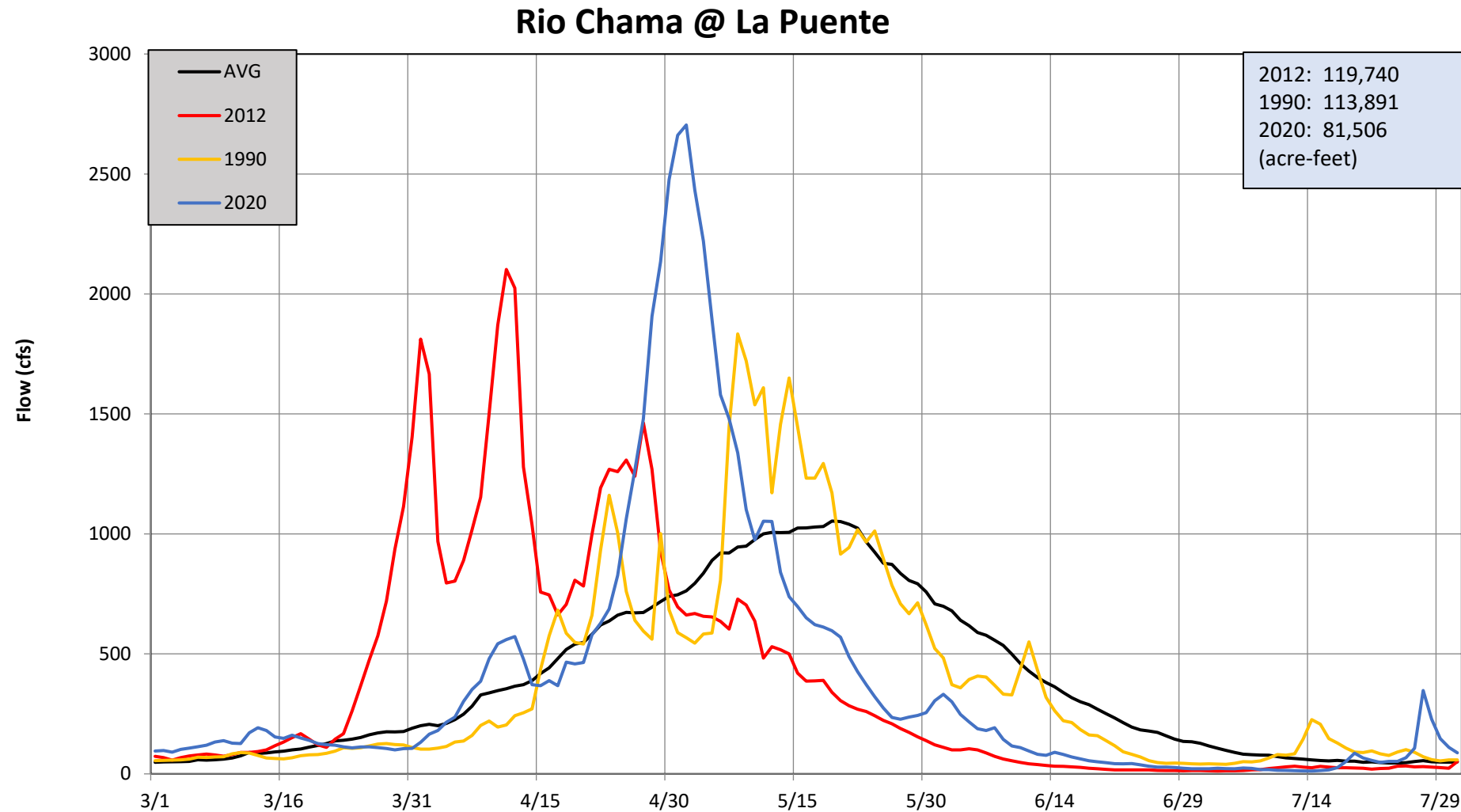
- Volume forecast from NRCS
- Based on snowpack, soil moisture, climate forecast
- Choose similar year based on similar volume
- Actual hydrograph vs. average hydrograph
- Can tweak timing of hydrograph to best match forecasted conditions (warm spring vs. cool spring)
- Inflows/outflows based on nature and policies
- Article VII restrictions
- Flood control and channel capacity
- Timing of water deliveries
- Demand curves from water users



Using NRCS/NWS Forecasting In the Model(s)...



Similar Year Hydrographs



Reservoirs by Agency and Water Source



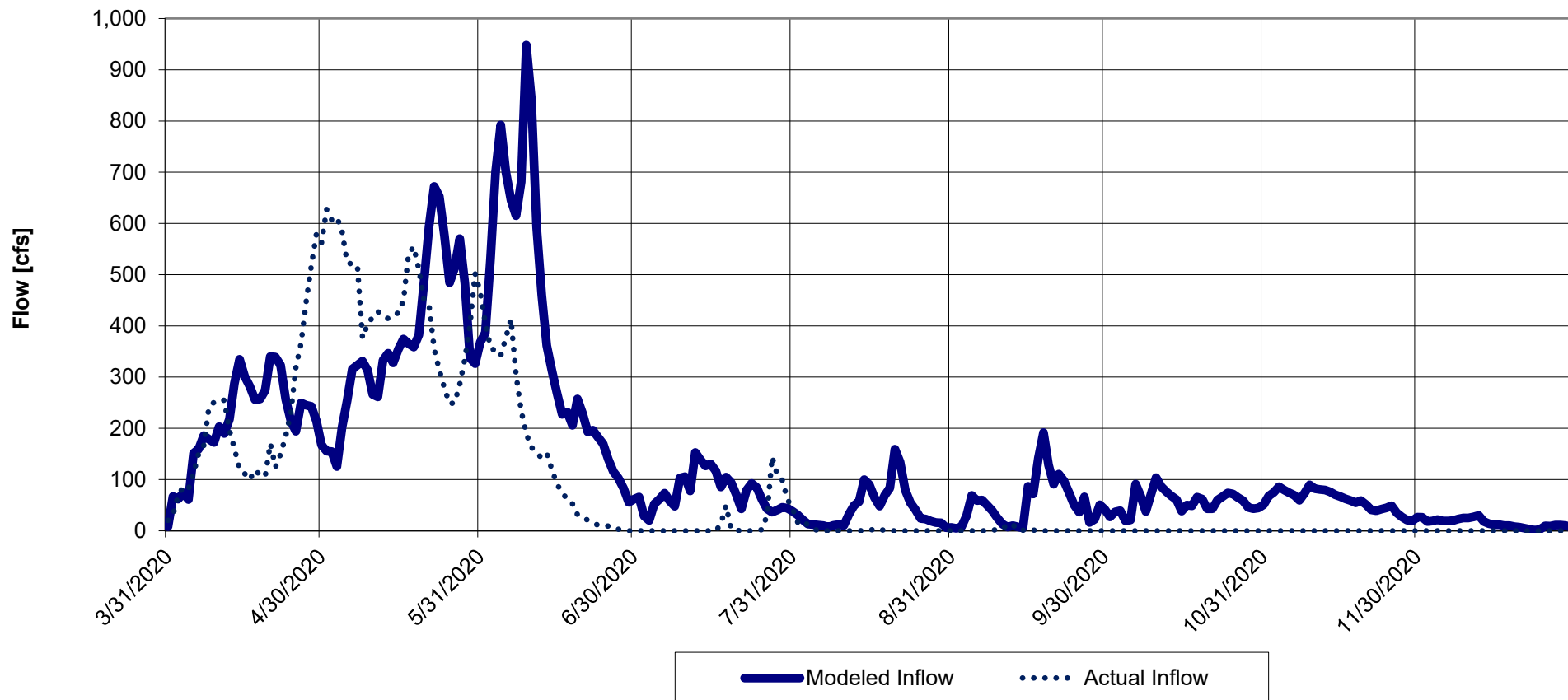
| <u>Operated By:</u> | Reclamation | Corps | Water Supply | Recreation | Flood Control | Sediment Control |
|---------------------|-------------|-------|--------------|------------|---------------|------------------|
| <u>Dams:</u> | | | | | | |
| HERON | | | | | | |
| EL VADO | | | | | | |
| ABIQUIU | | | | | | |
| NAMBE FALLS | | | | | | |
| GALISTEO | | | | | | |
| COCHITI | | | | | | |
| JEMEZ CANYON | | | | | | |
| ELEPHANT BUTTE | | | | | | |
| CABALLO | | | | | | |



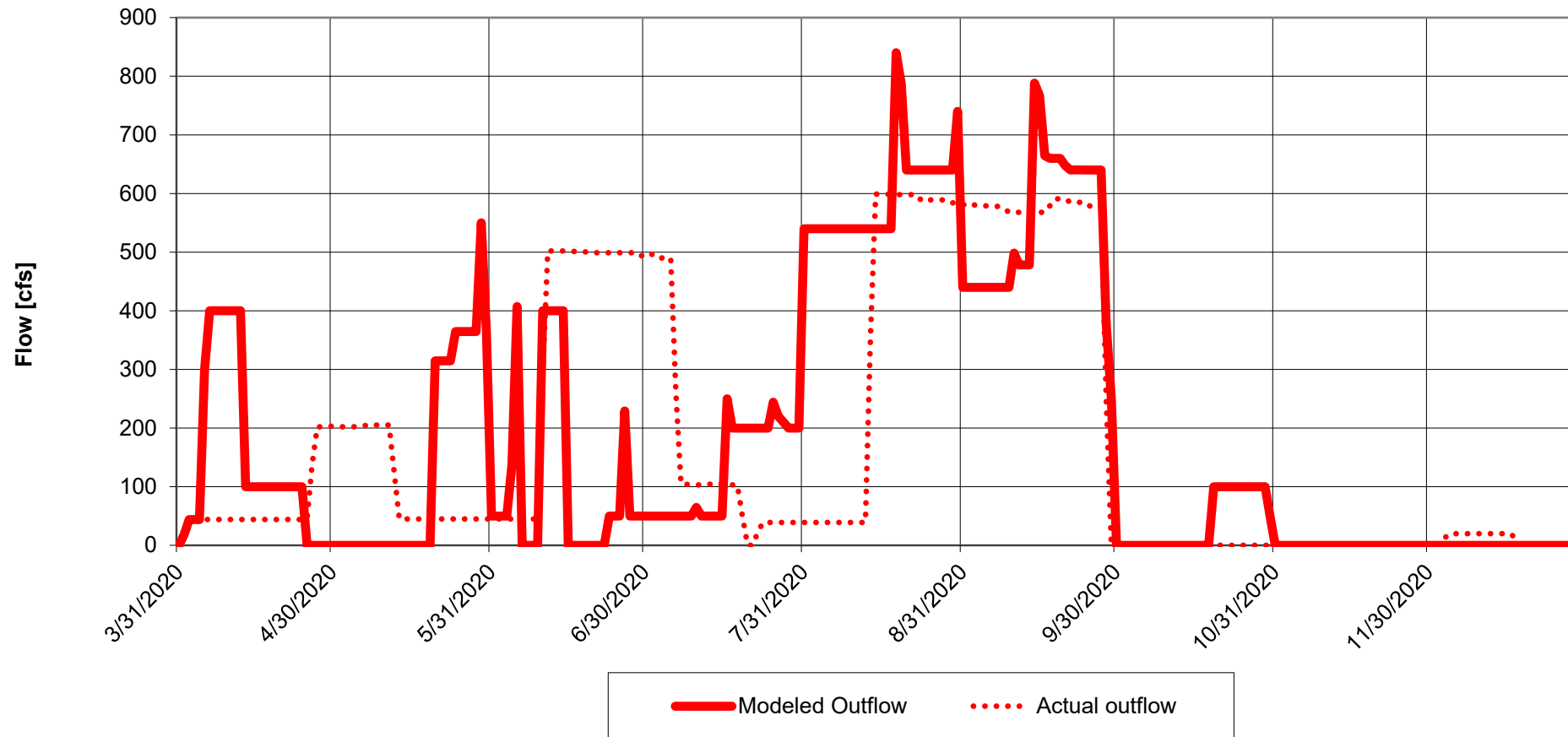
2020: The Year in Review



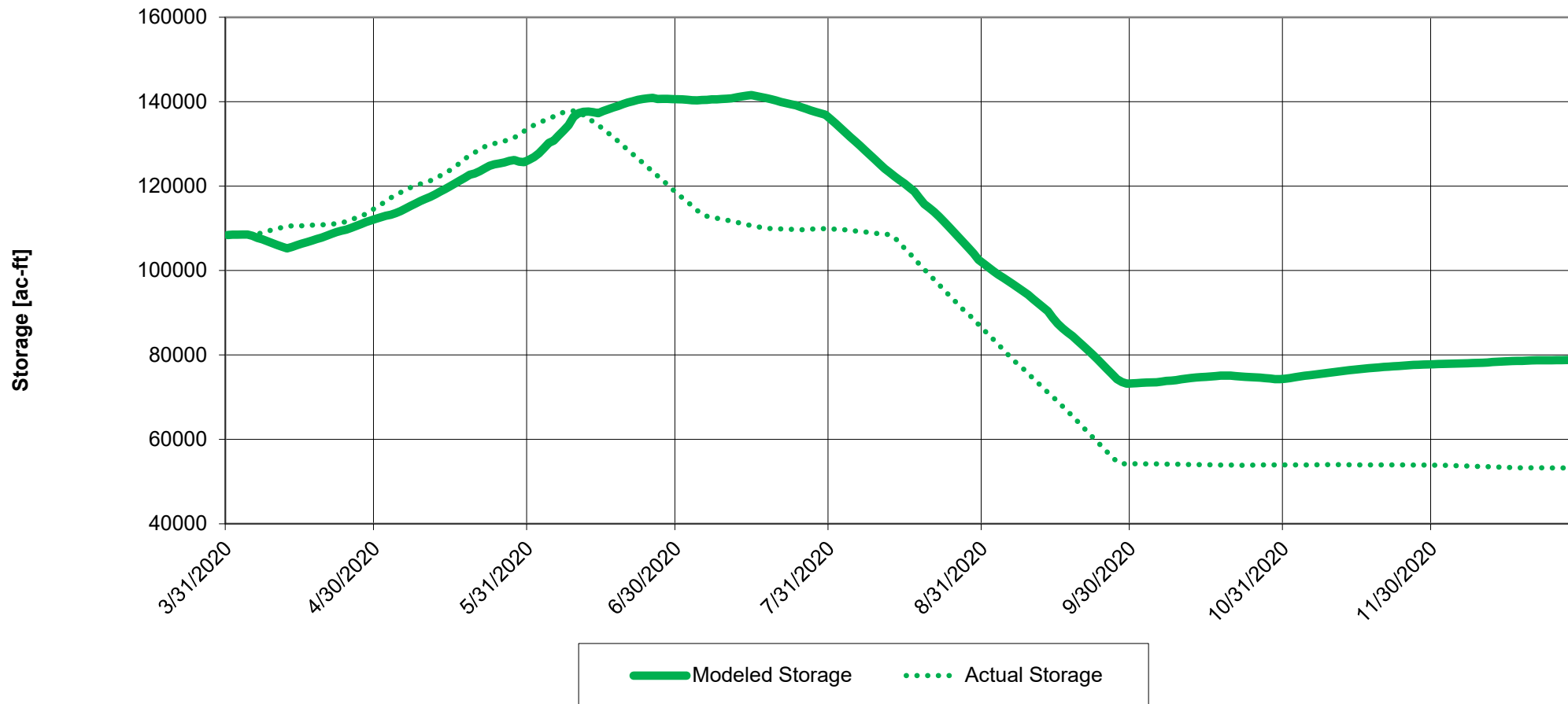
Heron Reservoir Inflow



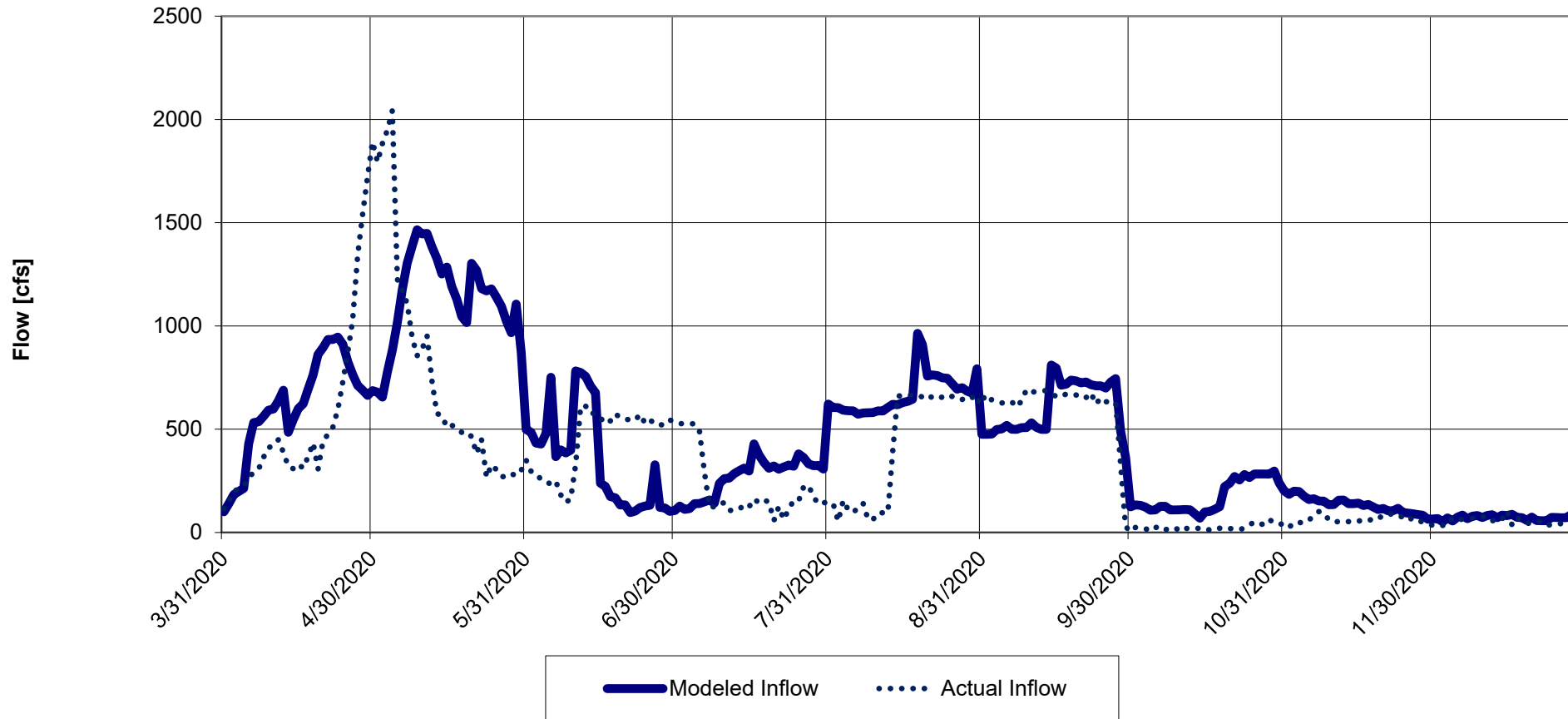
Heron Reservoir Outflow



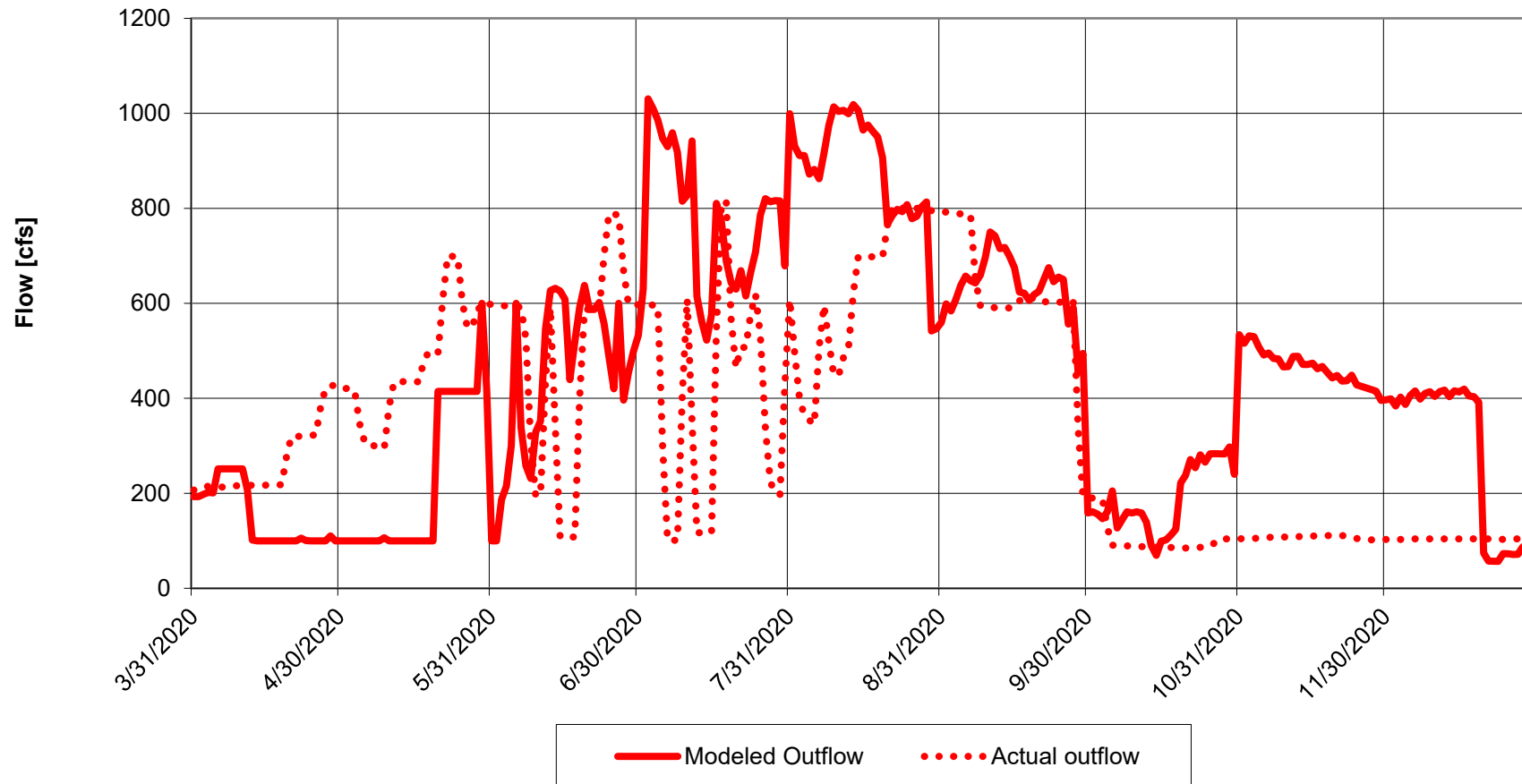
Heron Reservoir Storage



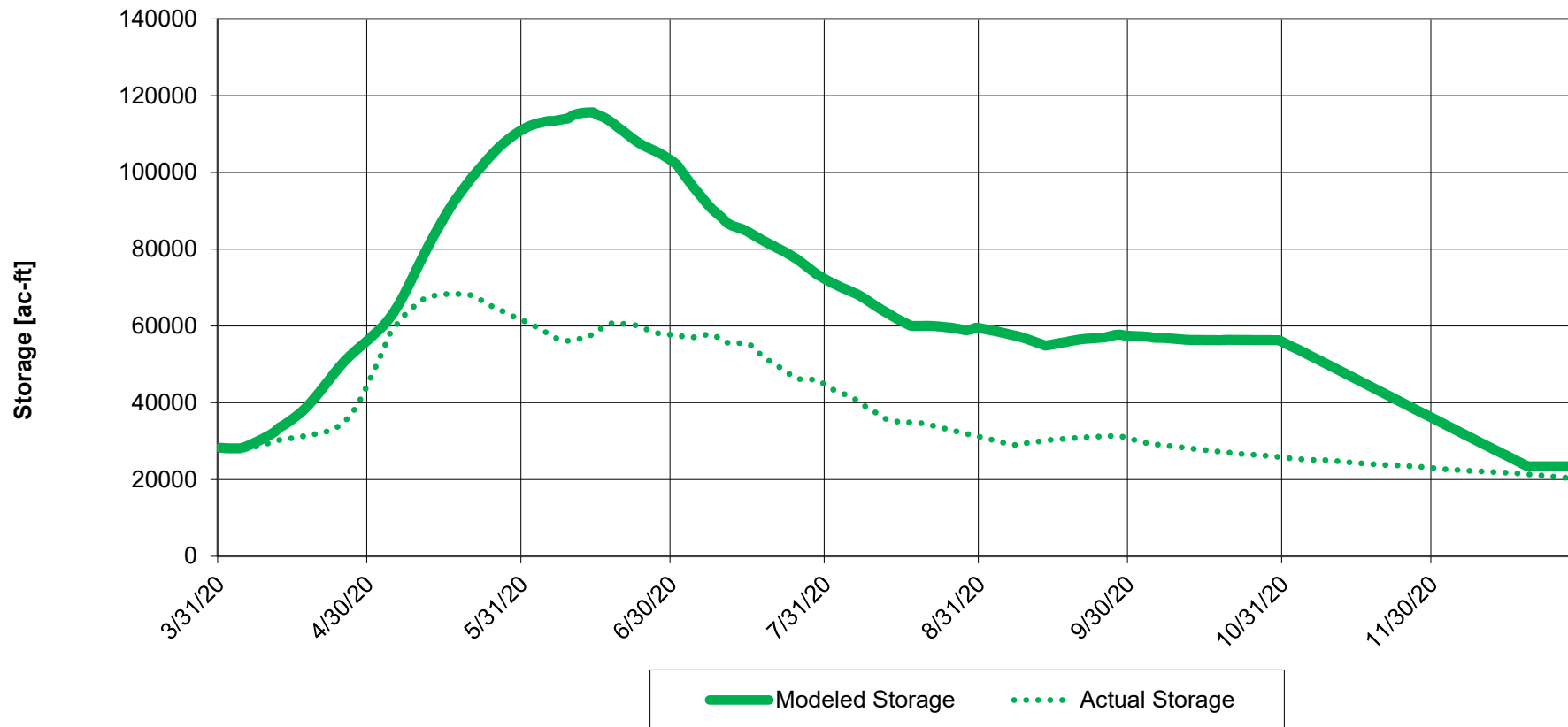
El Vado Reservoir Inflow



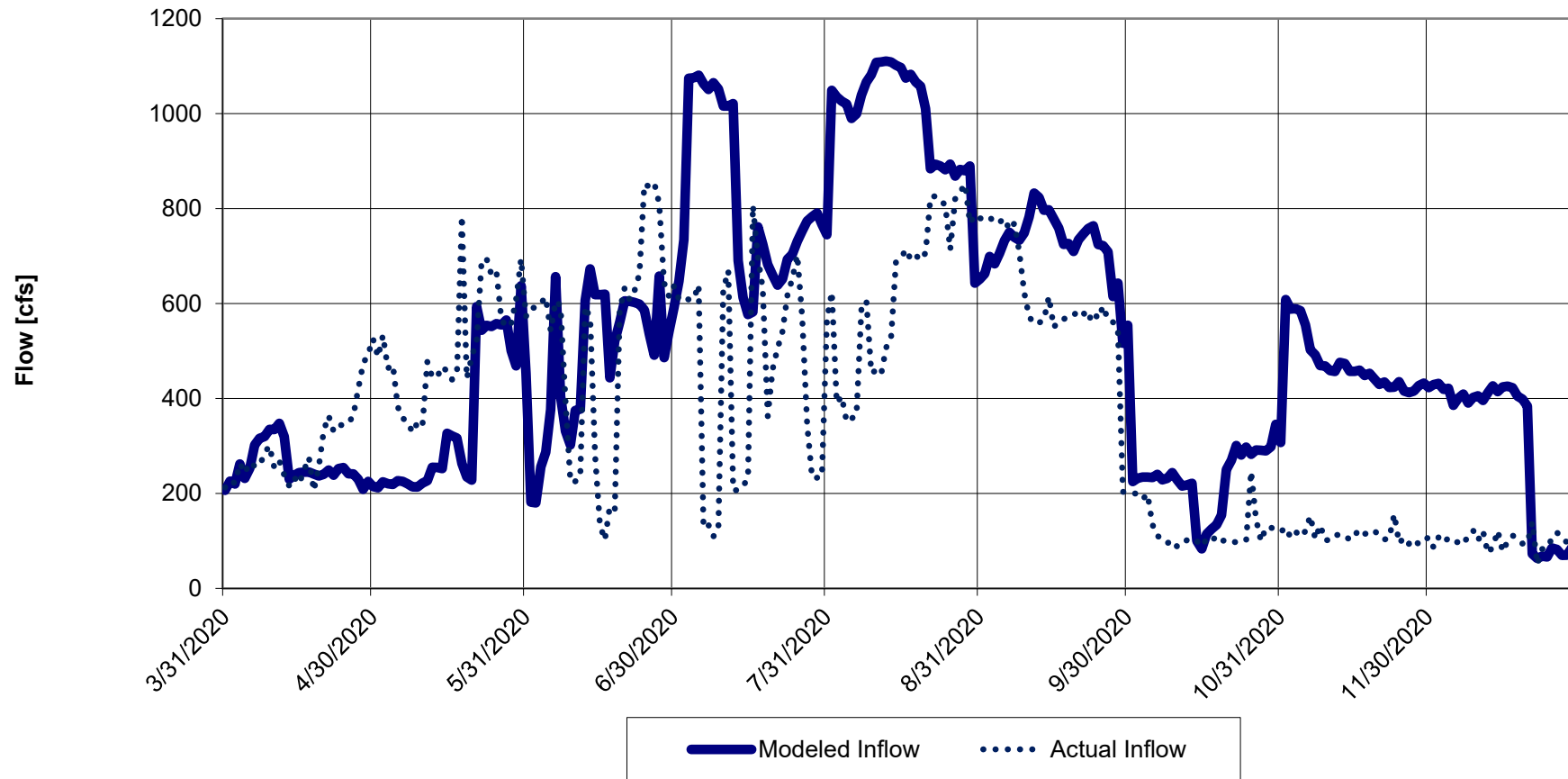
El Vado Reservoir Outflow



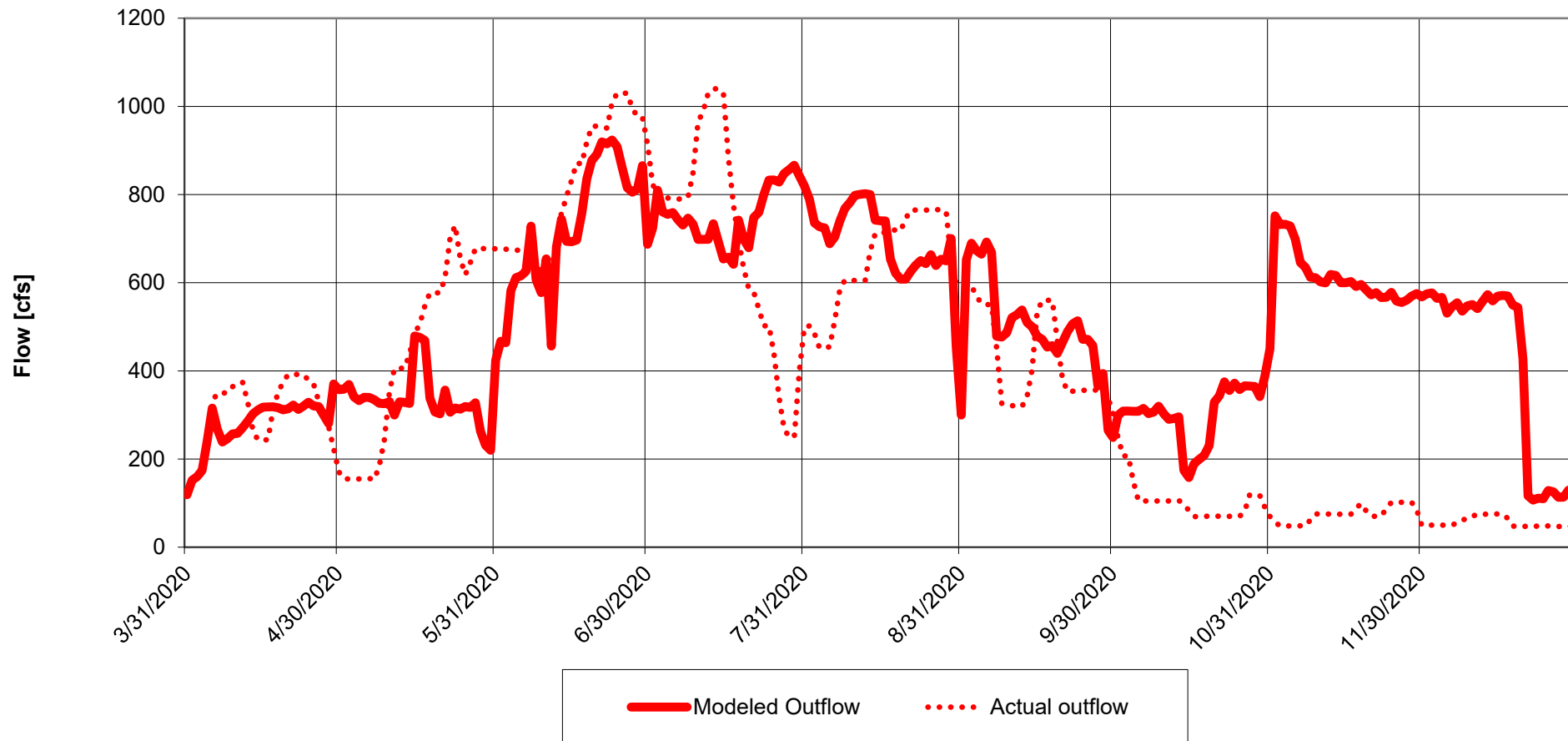
El Vado Reservoir Storage



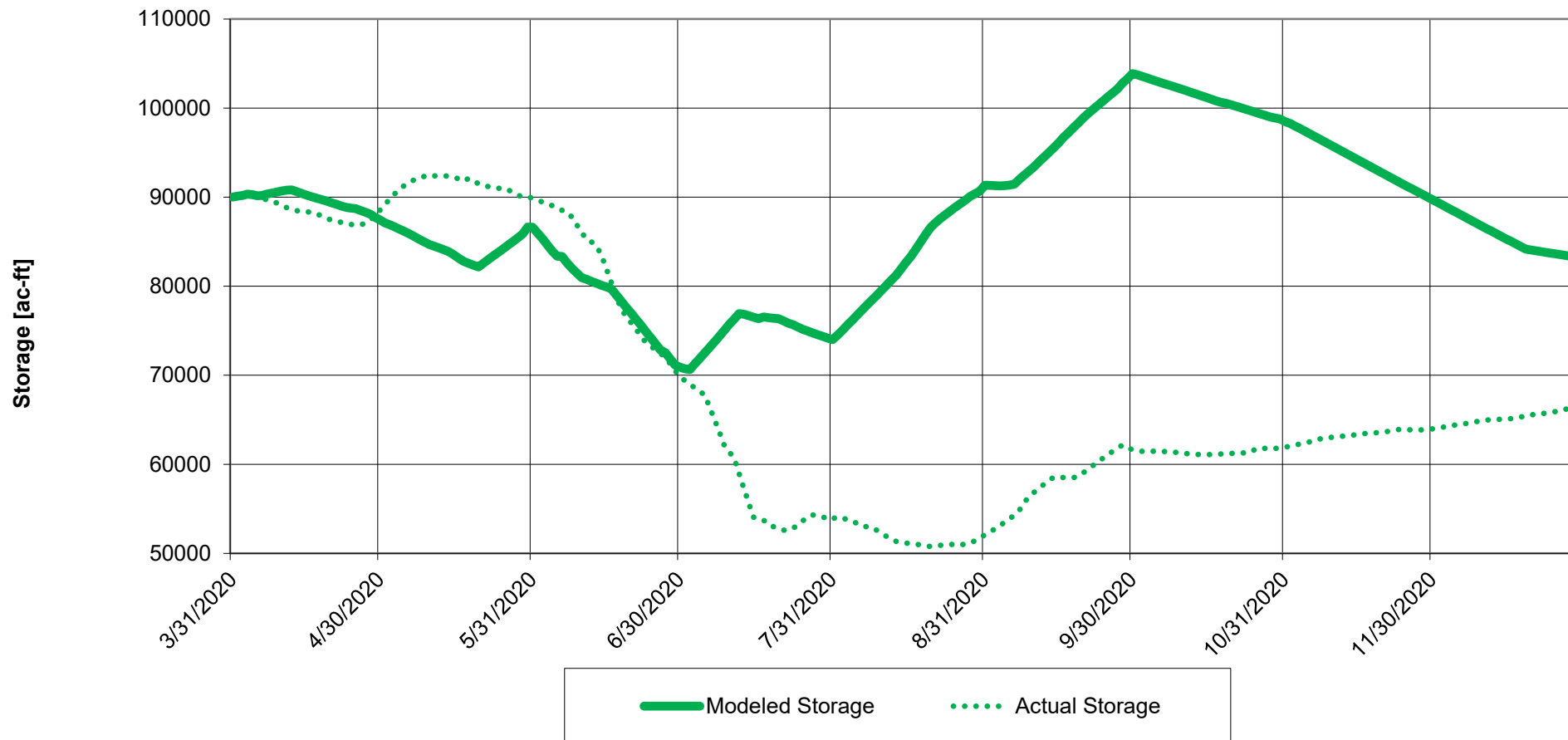
Abiquiu Reservoir Inflow



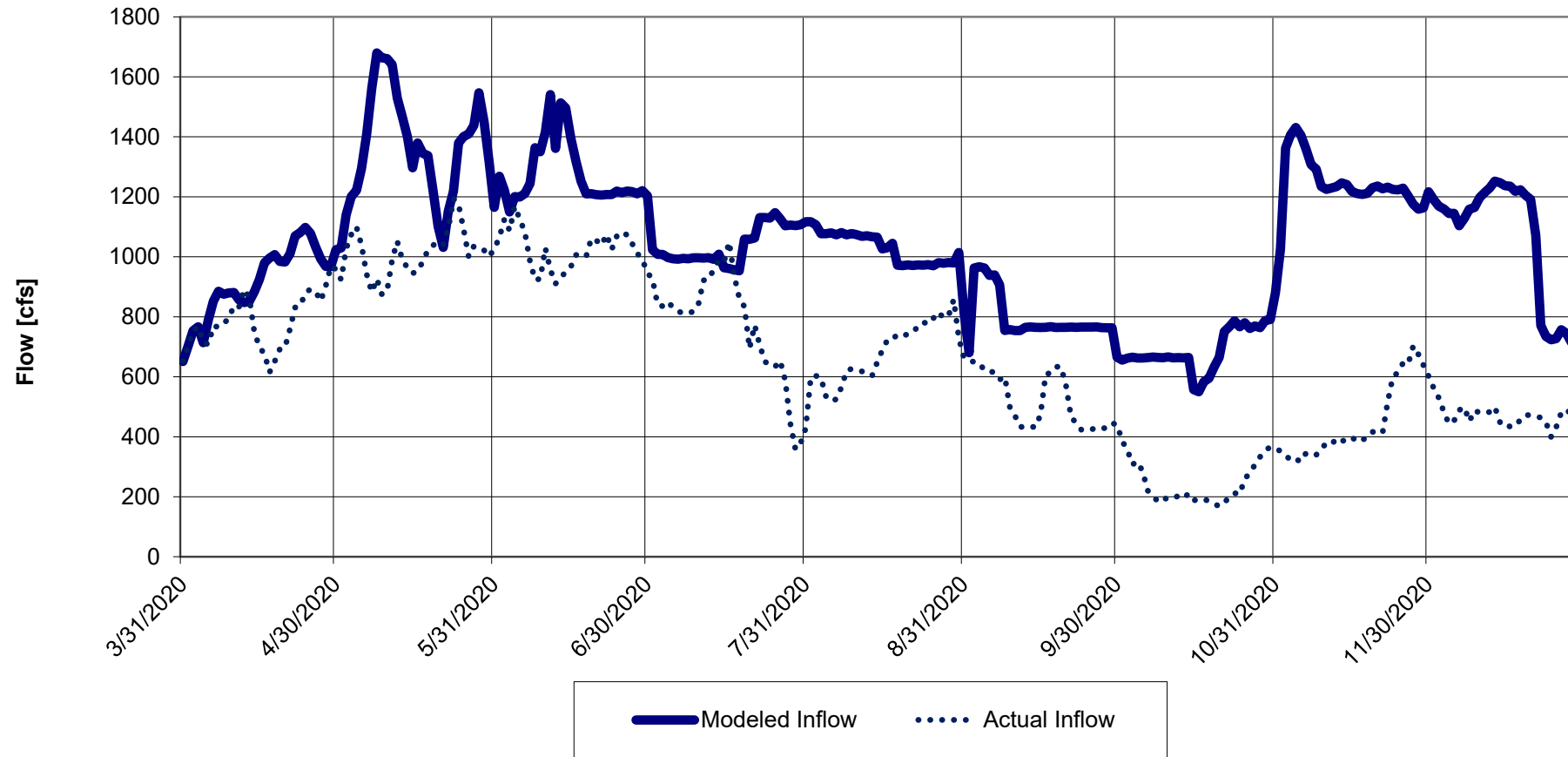
Abiquiu Reservoir Outflow



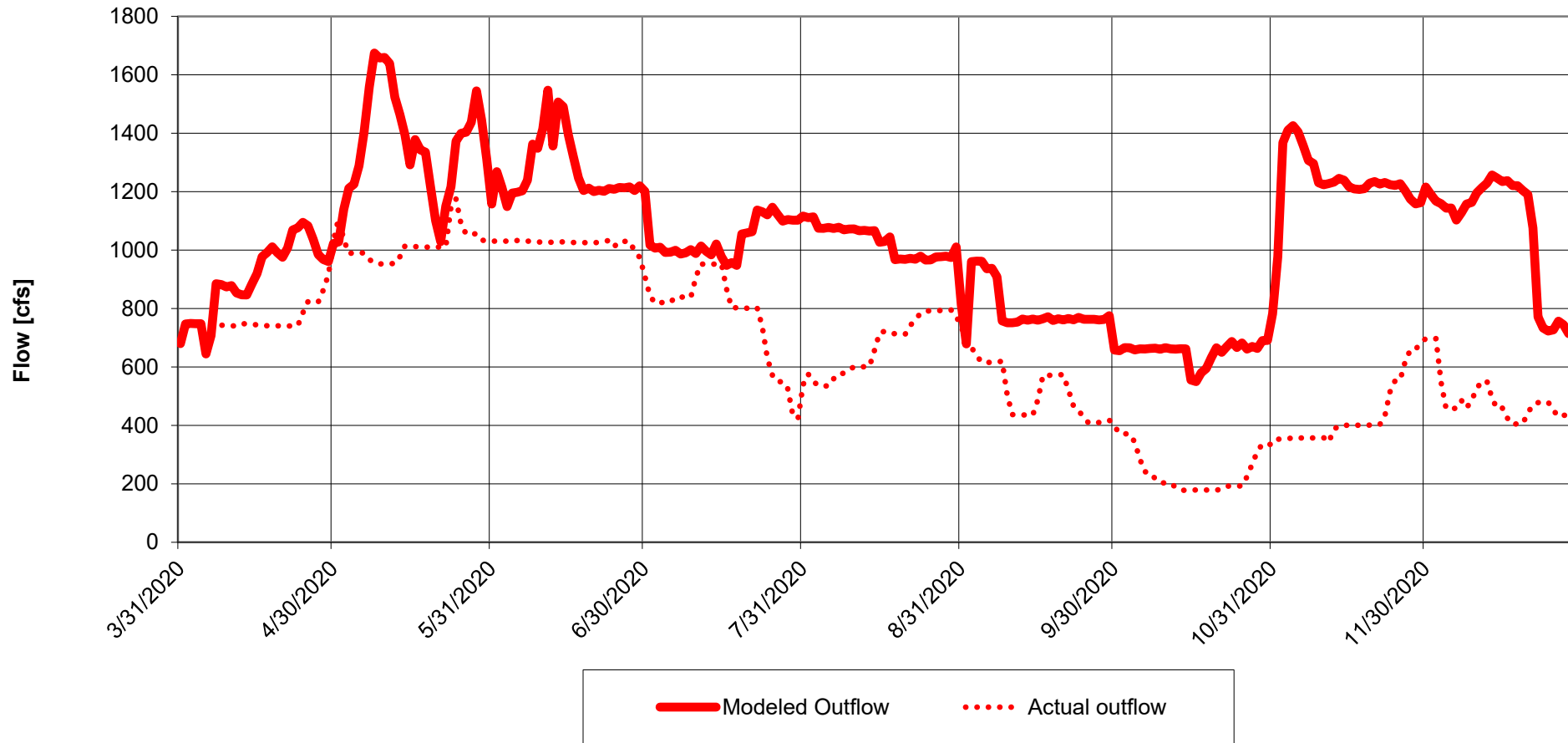
Abiquiu Reservoir Storage



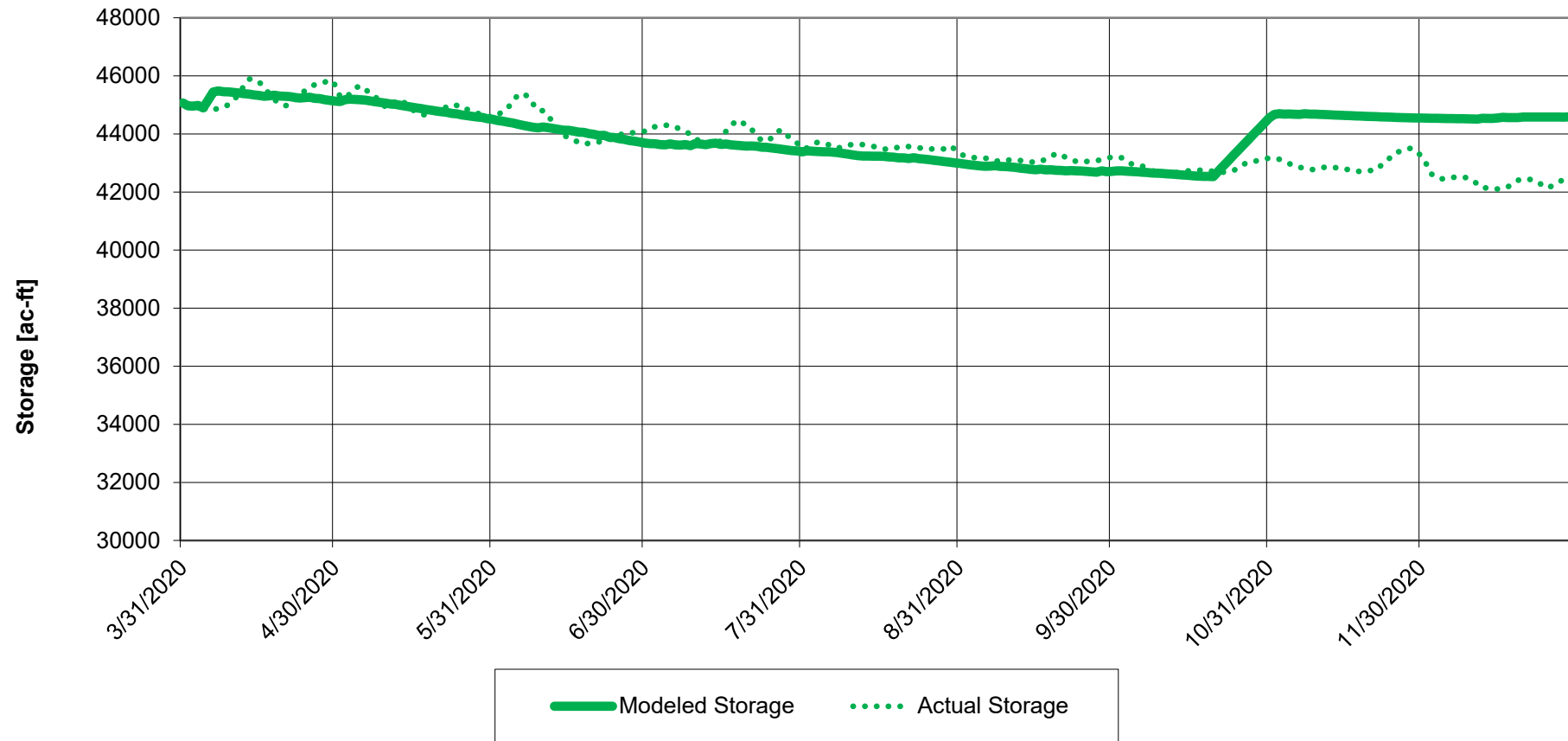
Cochiti Reservoir Inflow



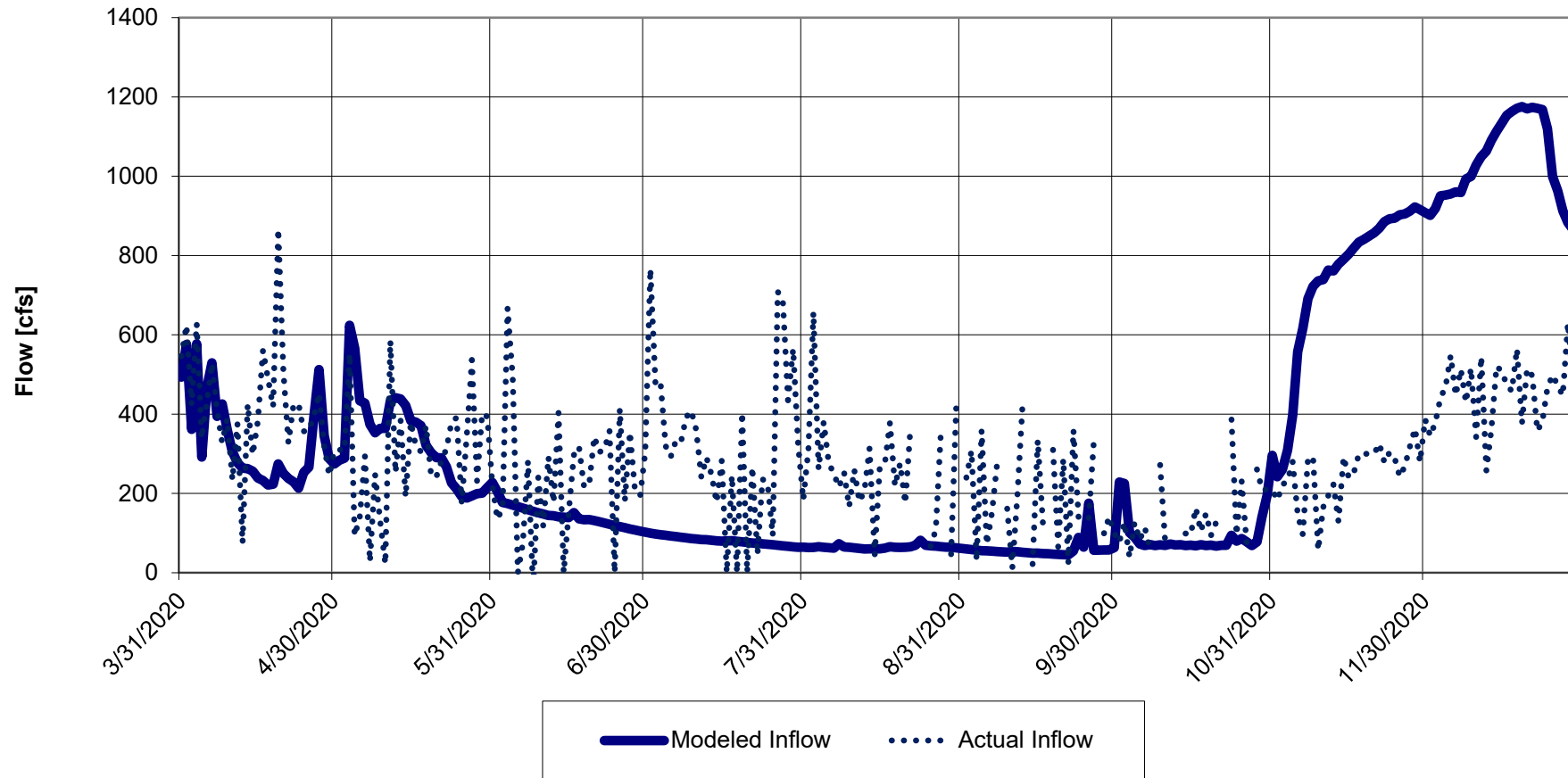
Cochiti Reservoir Outflow



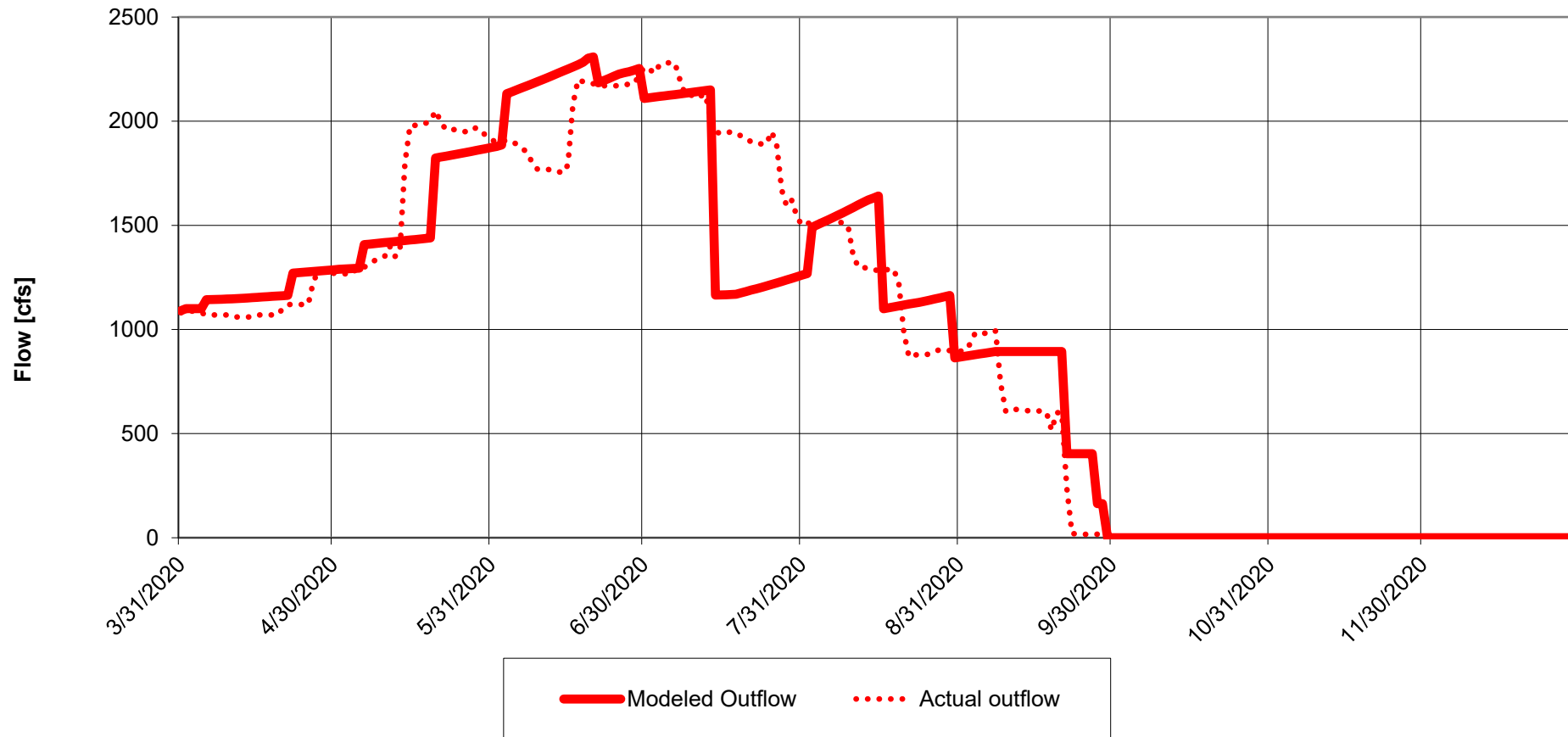
Cochiti Reservoir Storage



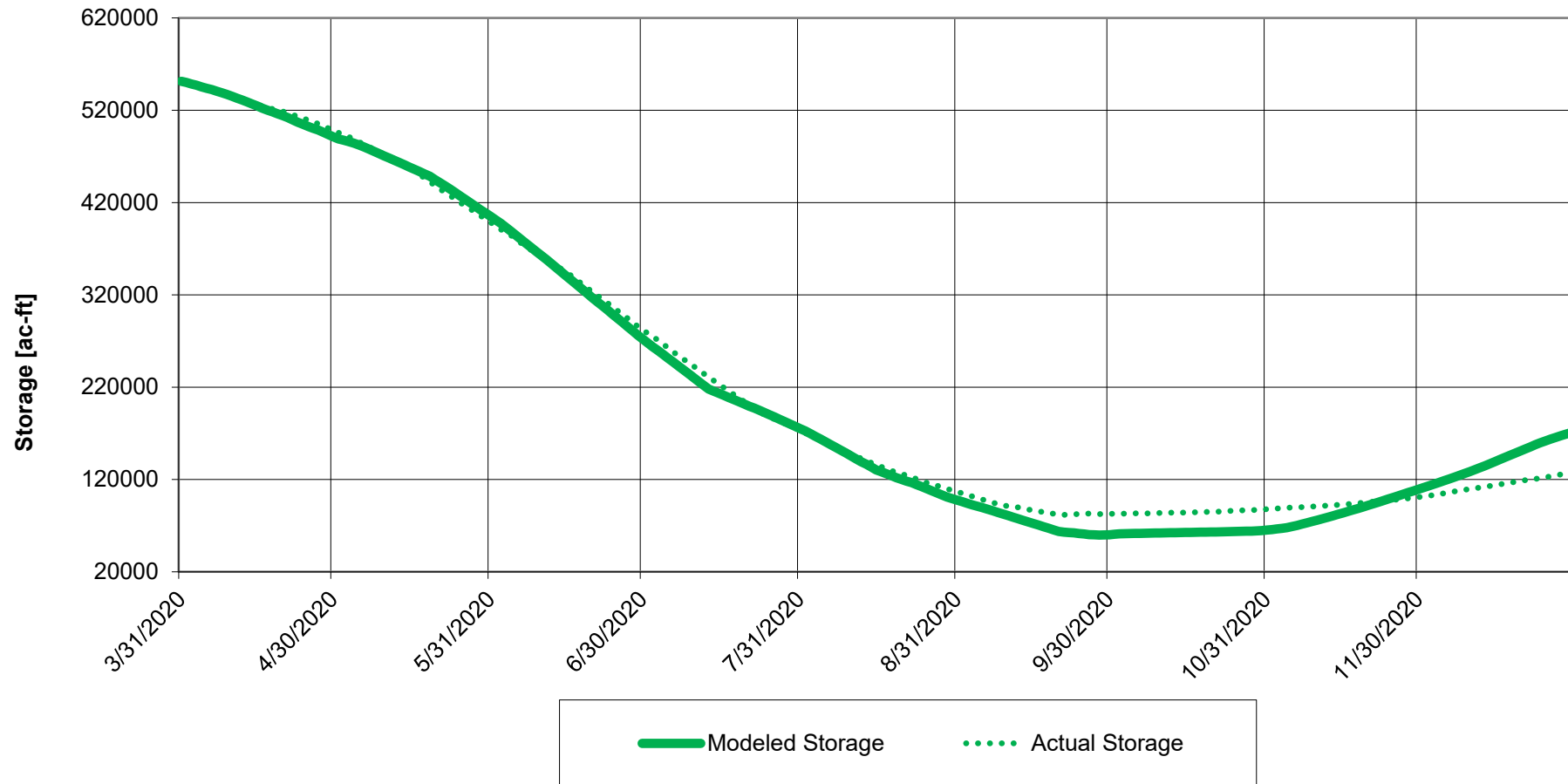
Elephant Butte Reservoir Inflow



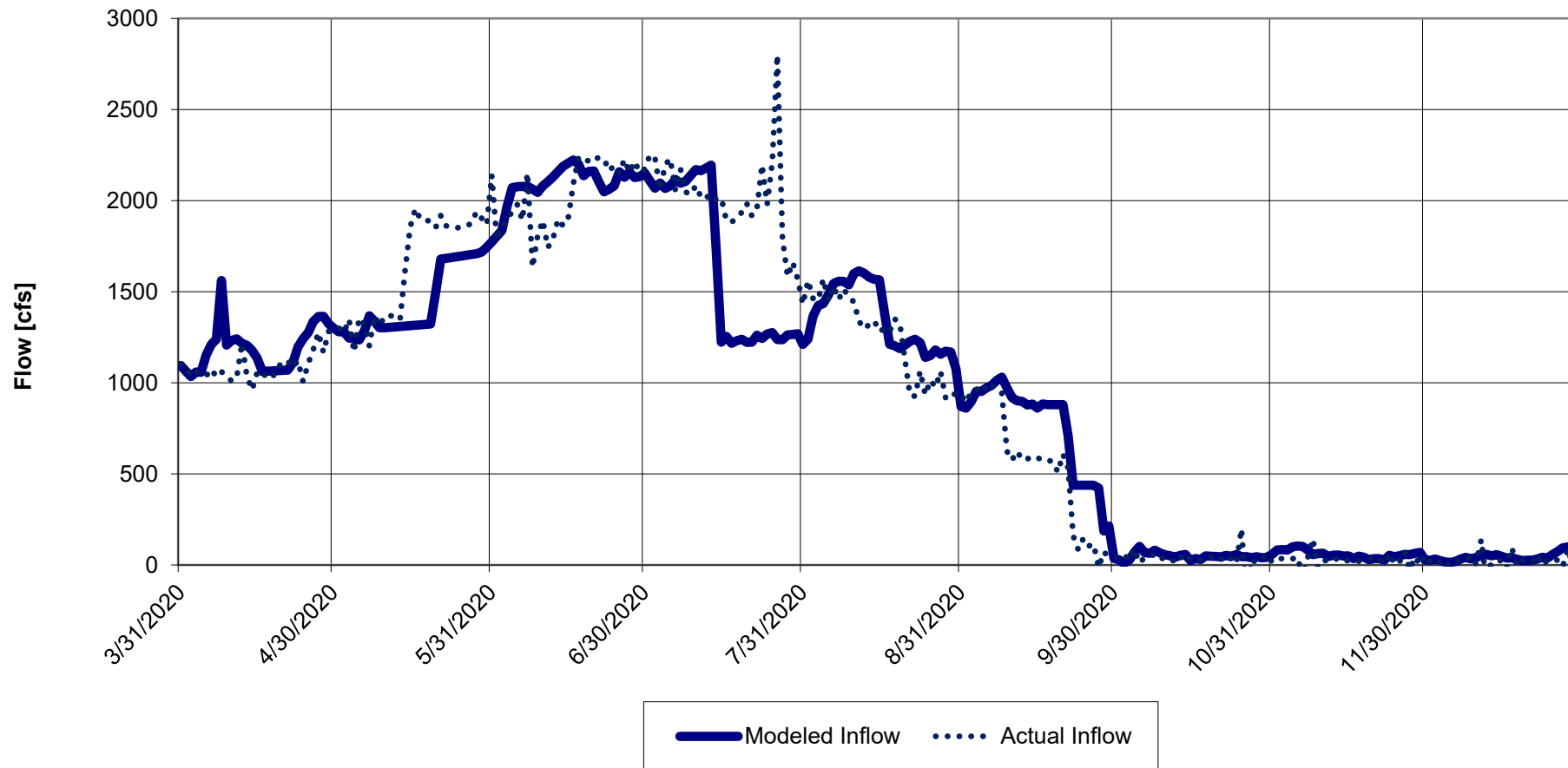
Elephant Butte Reservoir



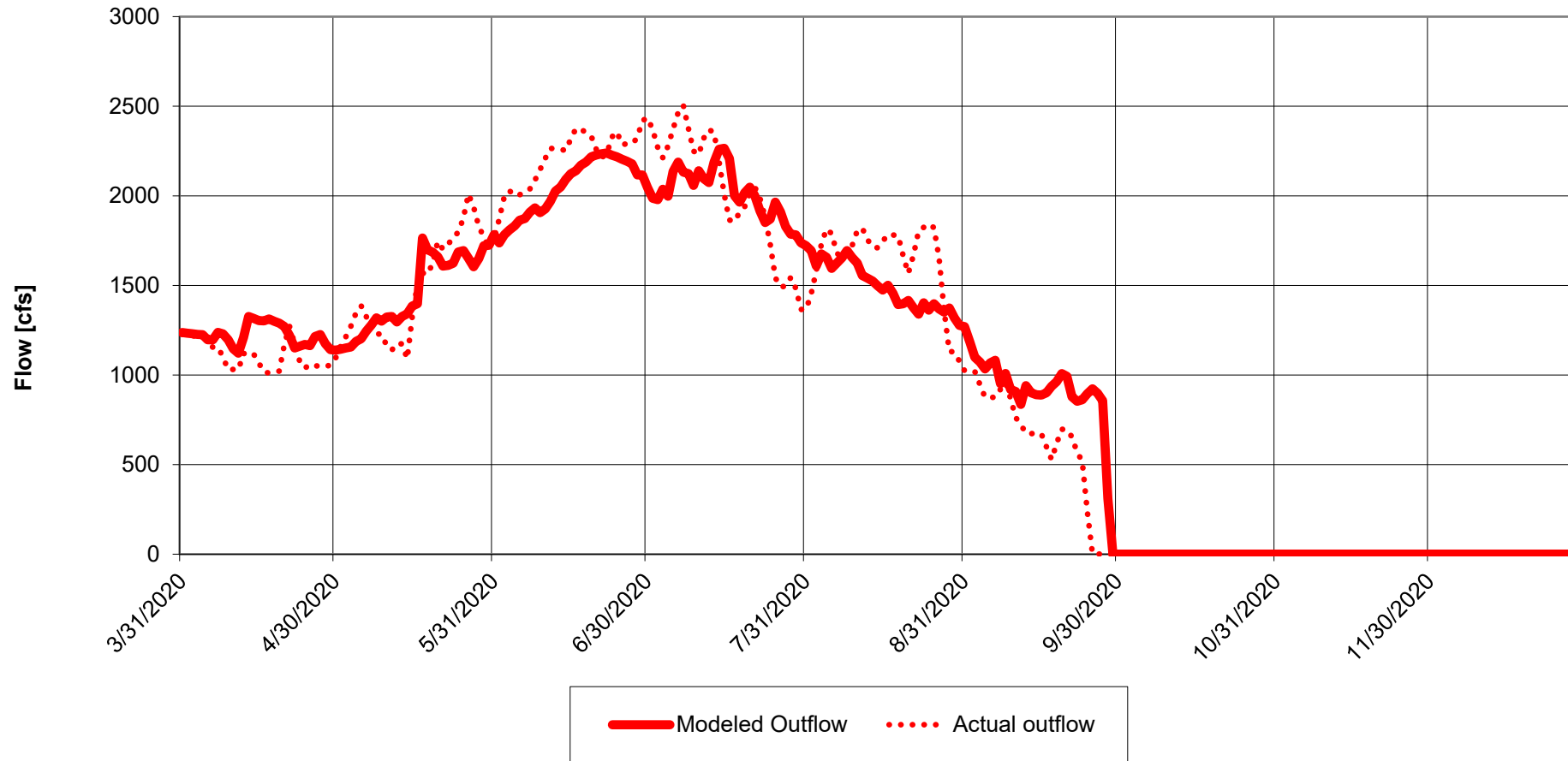
Elephant Butte Reservoir Storage



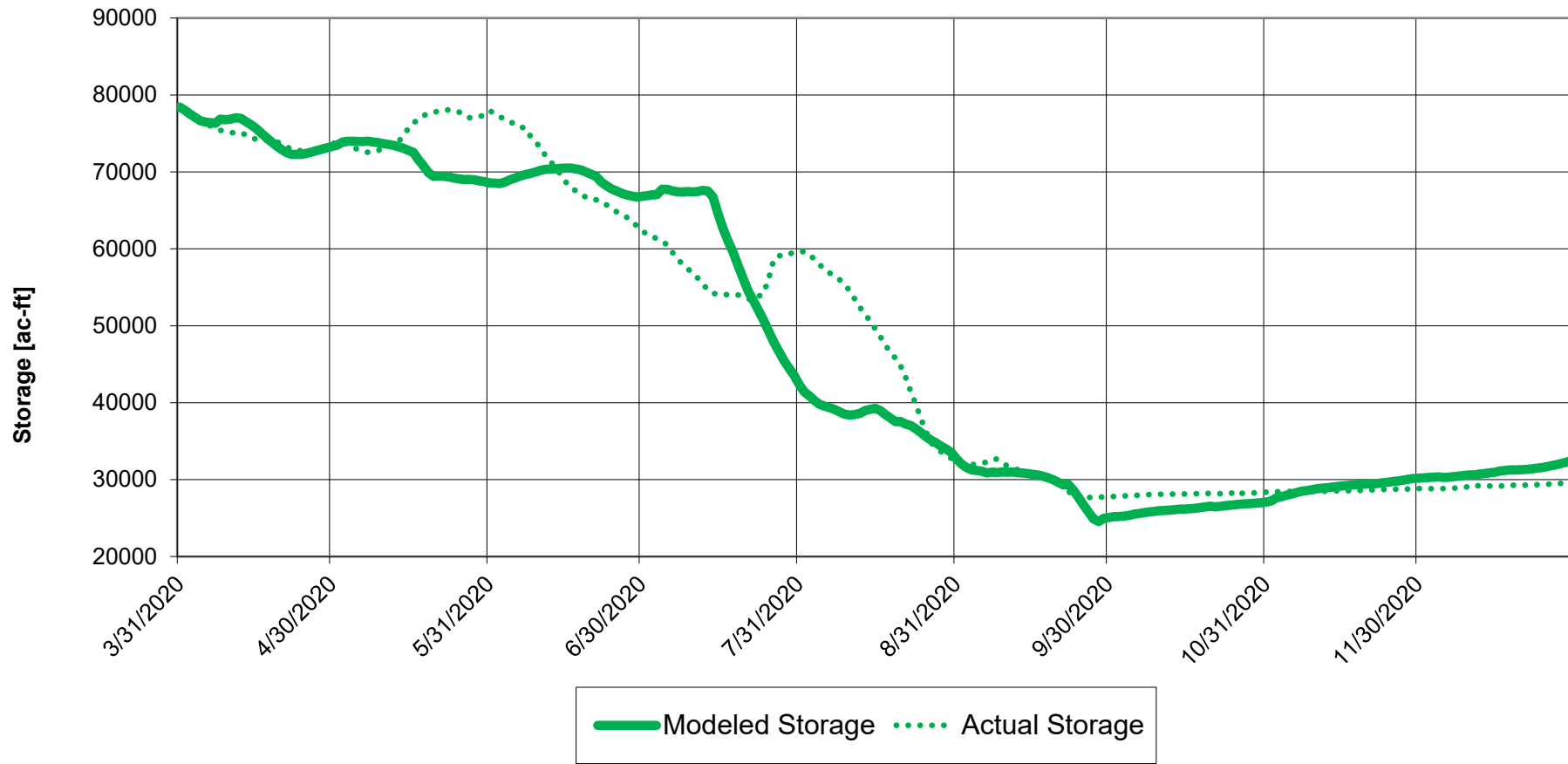
Caballo Reservoir Inflow



Caballo Reservoir Outflow



Caballo Reservoir Storage



2020 Rio Grande Project Operations

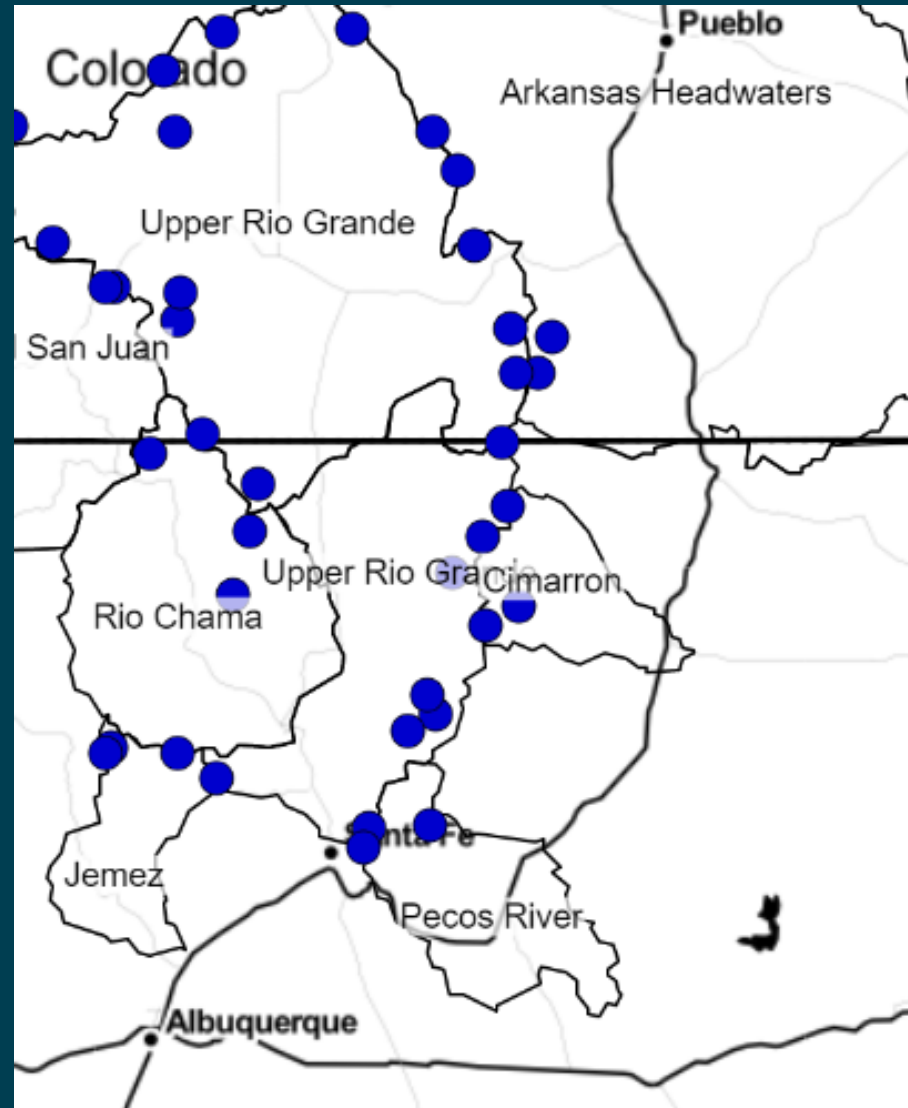
- Irrigation releases – March 13 to September 25
- Caballo released 592,862 ac-ft
- Bonita Lateral – 1,138 ac-ft
- HCCRD – 45,792 ac-ft



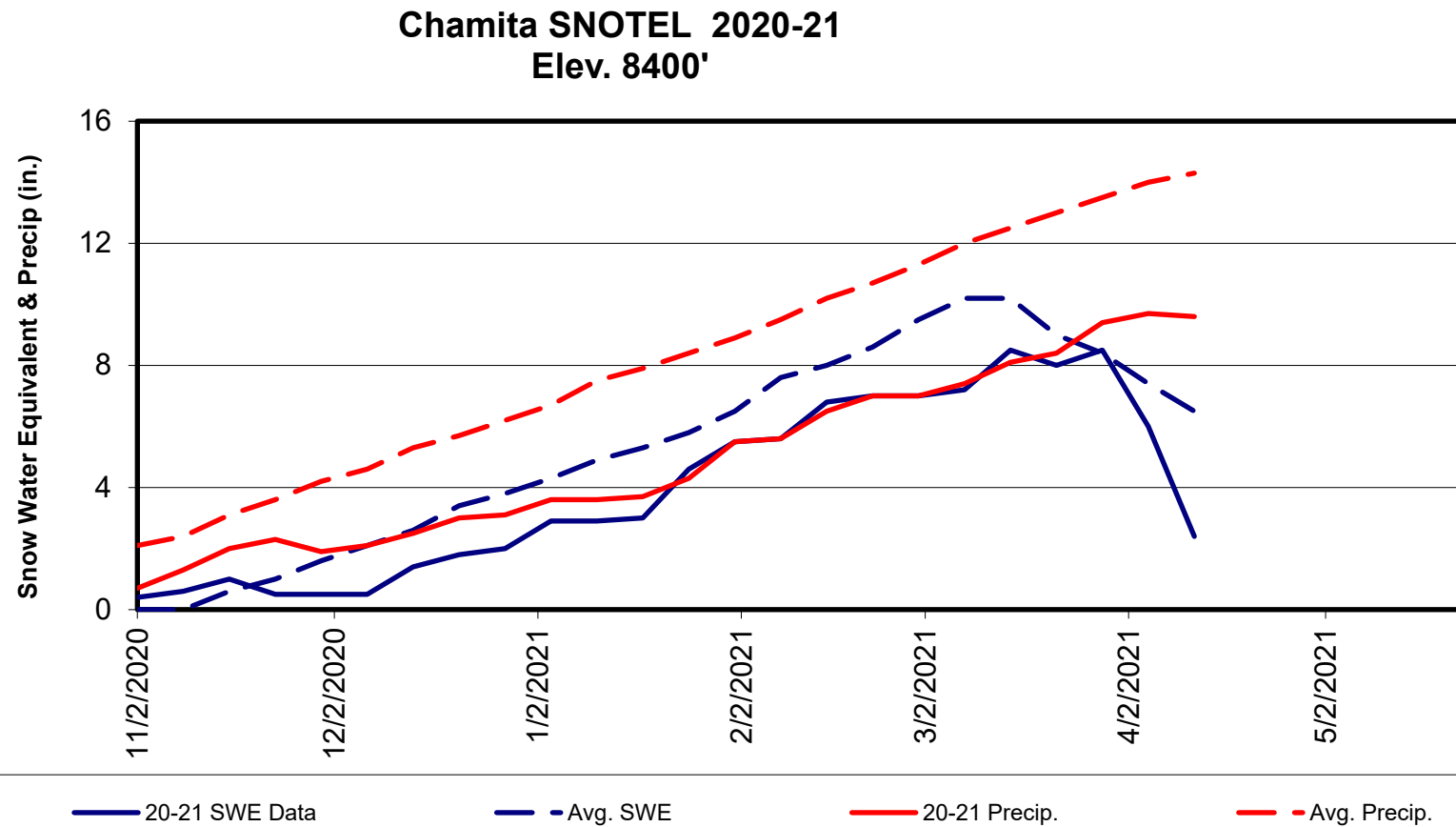
Current Snow Conditions



SNOTEL Locations

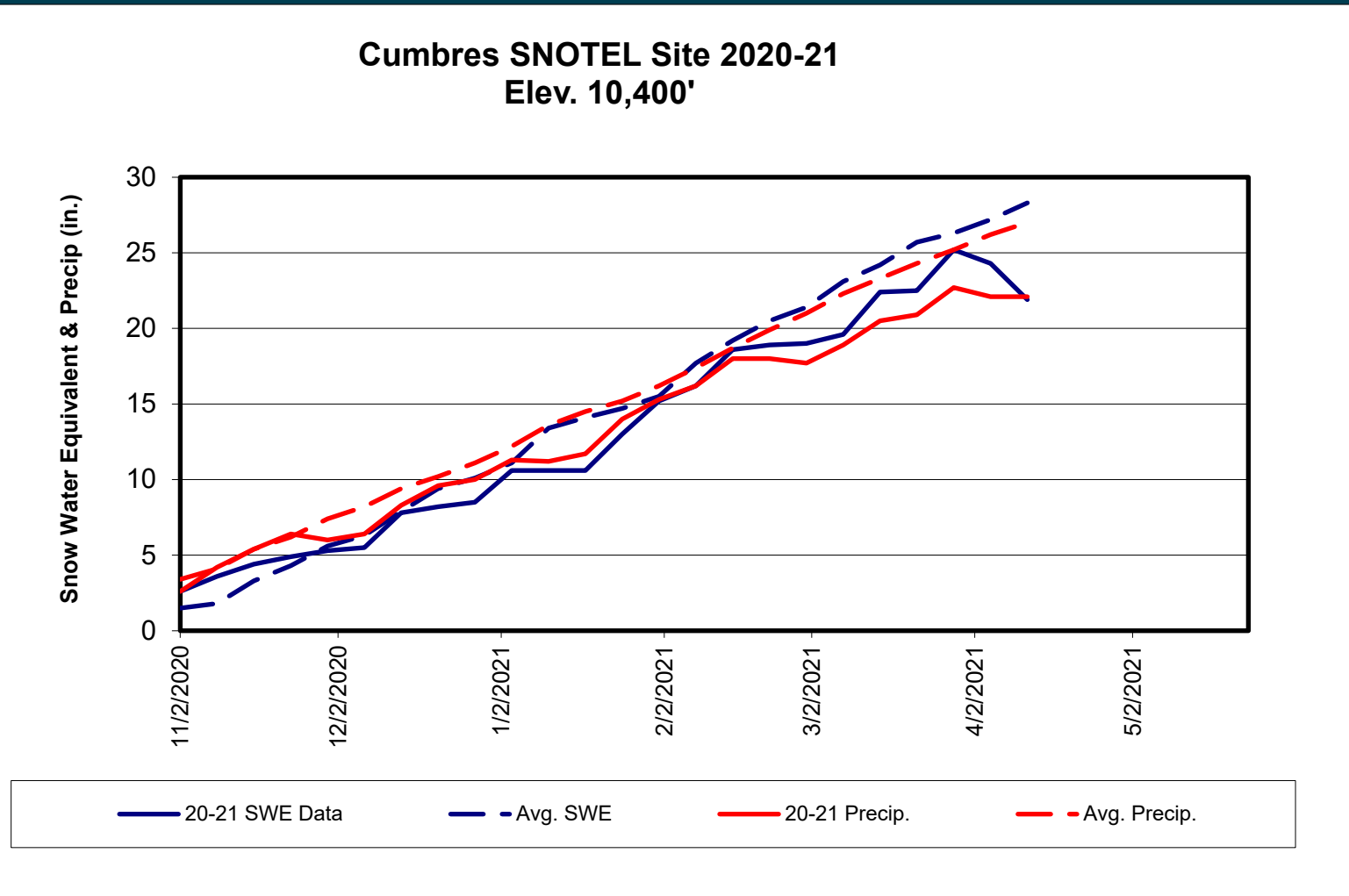


Rio Chama Snow Data

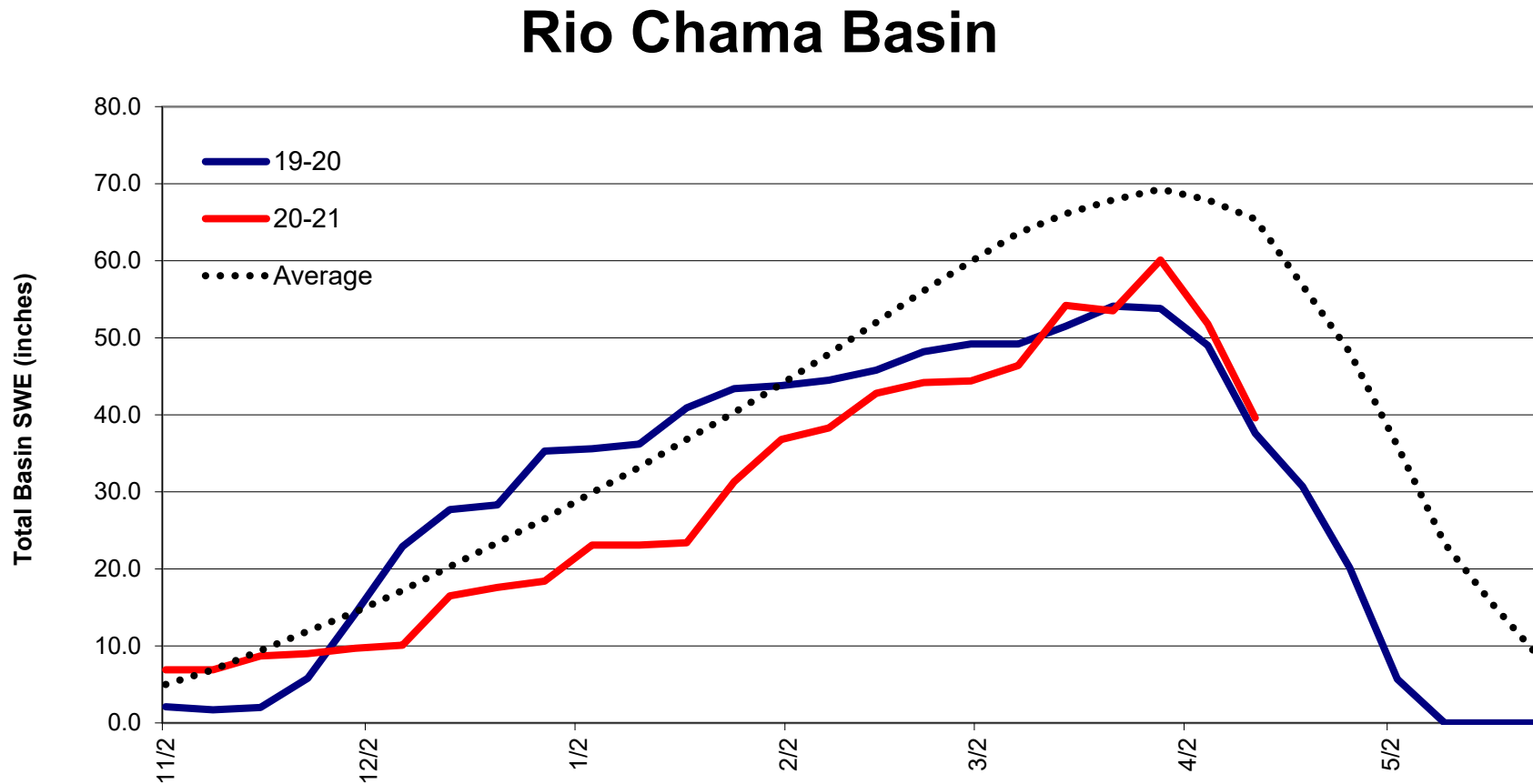


Rio Chama Snow Data

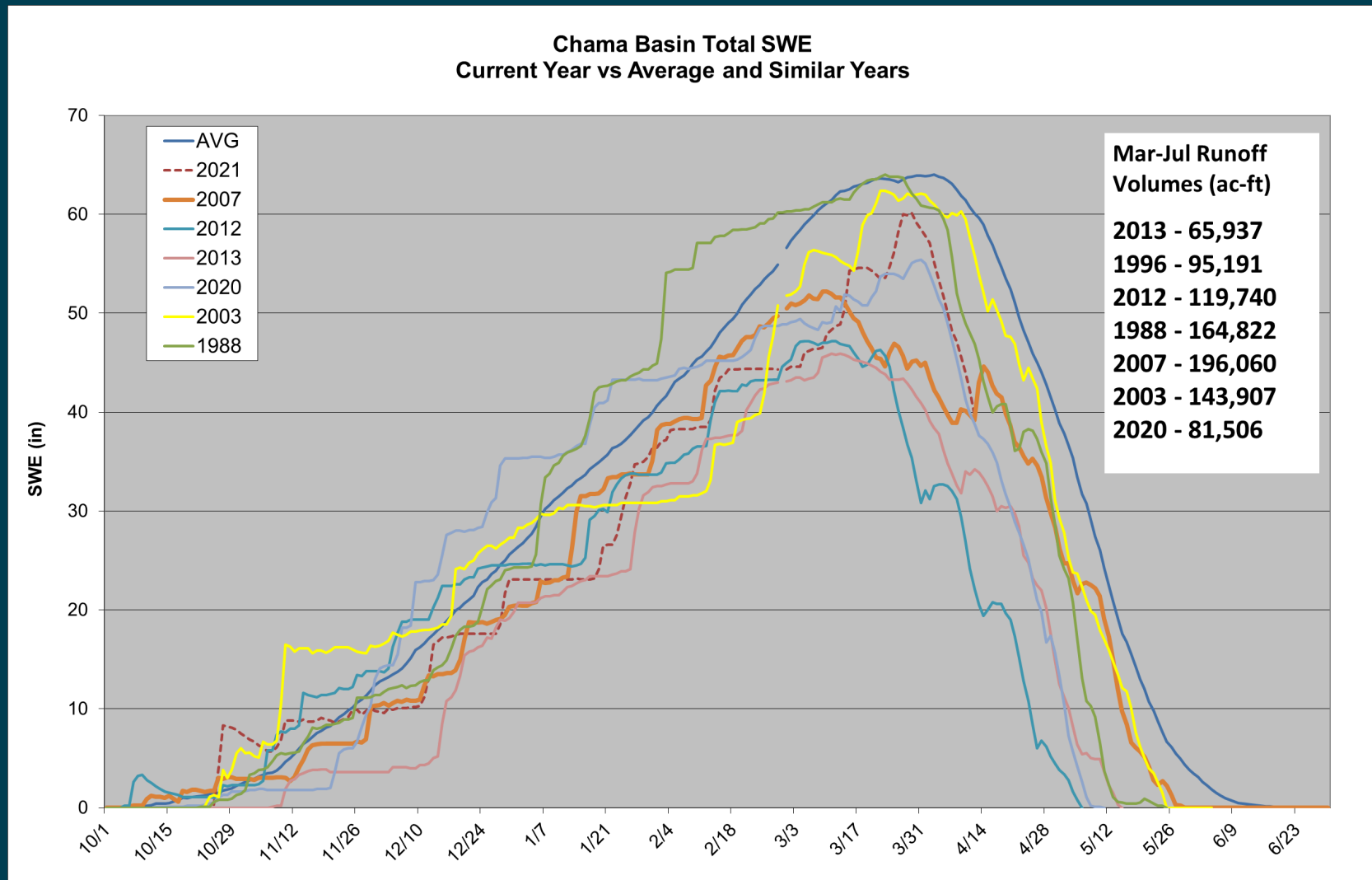
(continued)



Rio Chama Snow Comparison

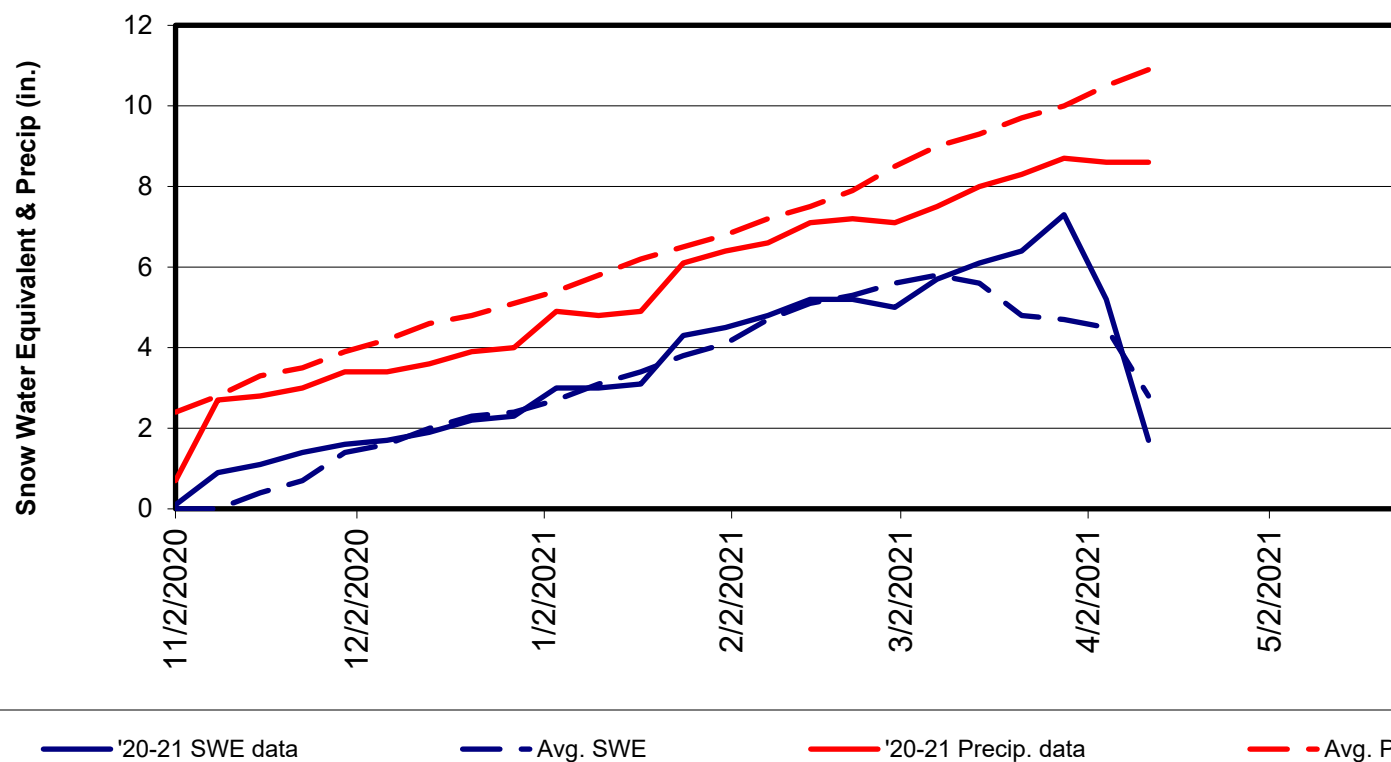


Similar Snowpack Years



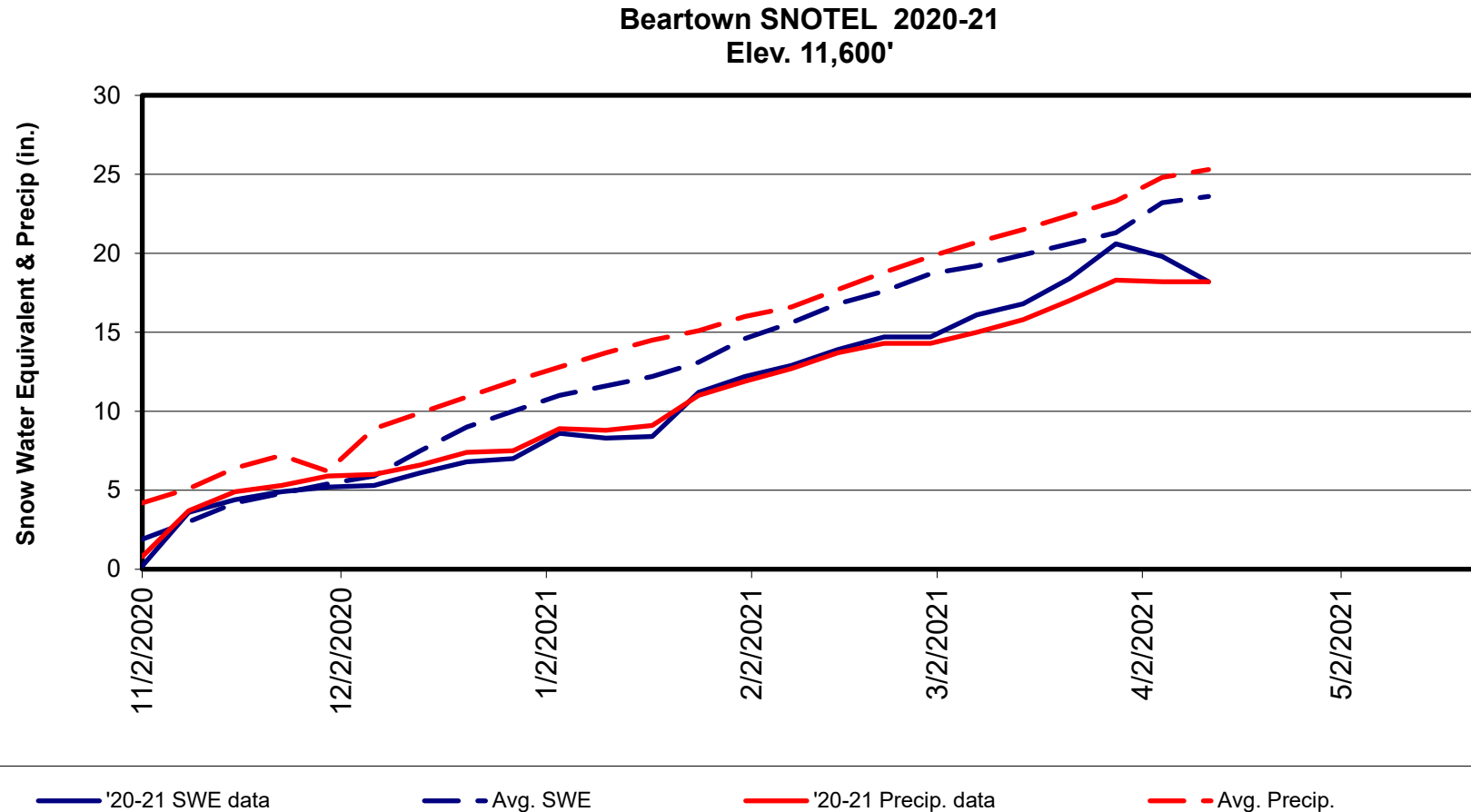
Rio Grande Snow Data

Upper Rio Grande SNOTEL 2020-21
Elev. 9,400'

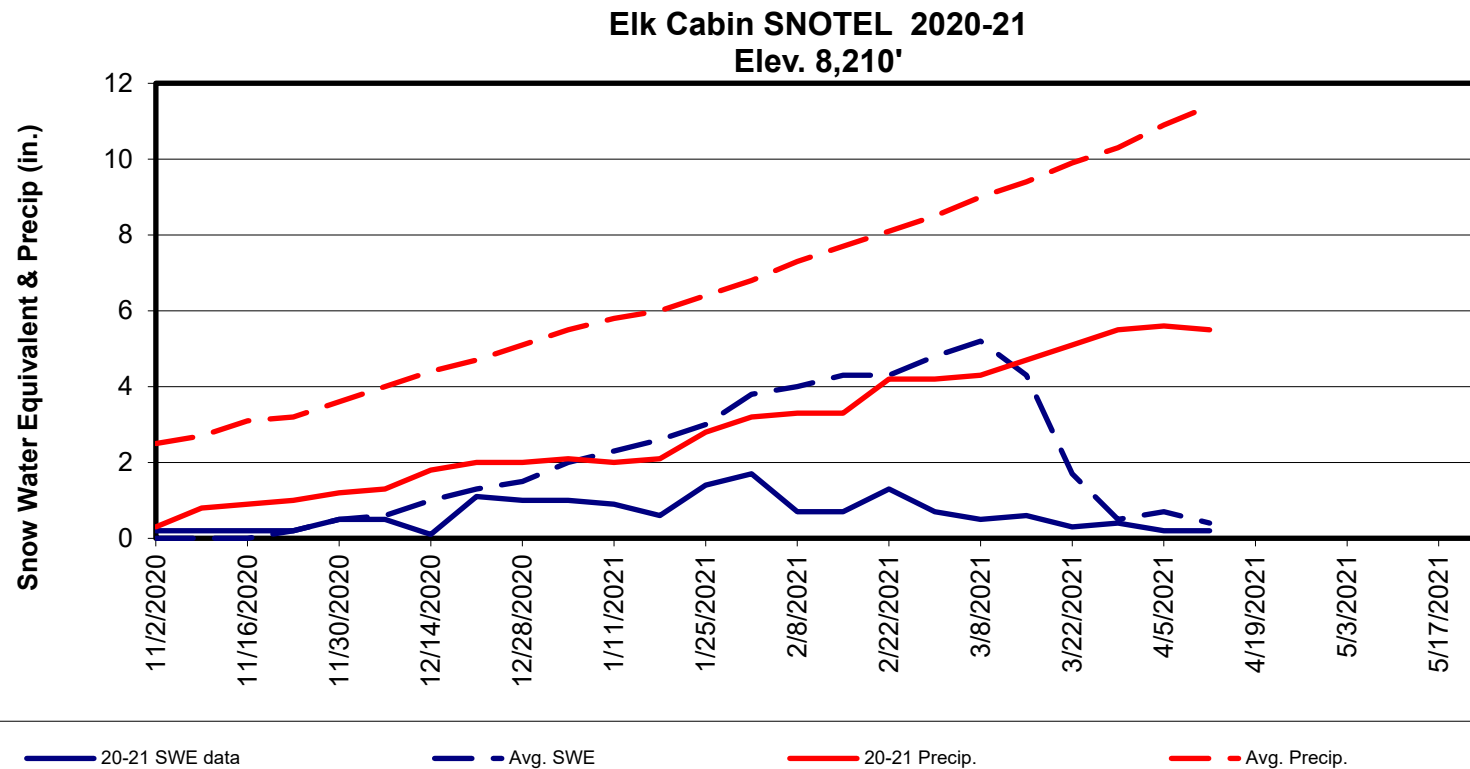


Rio Grande Snow Data

(continued)

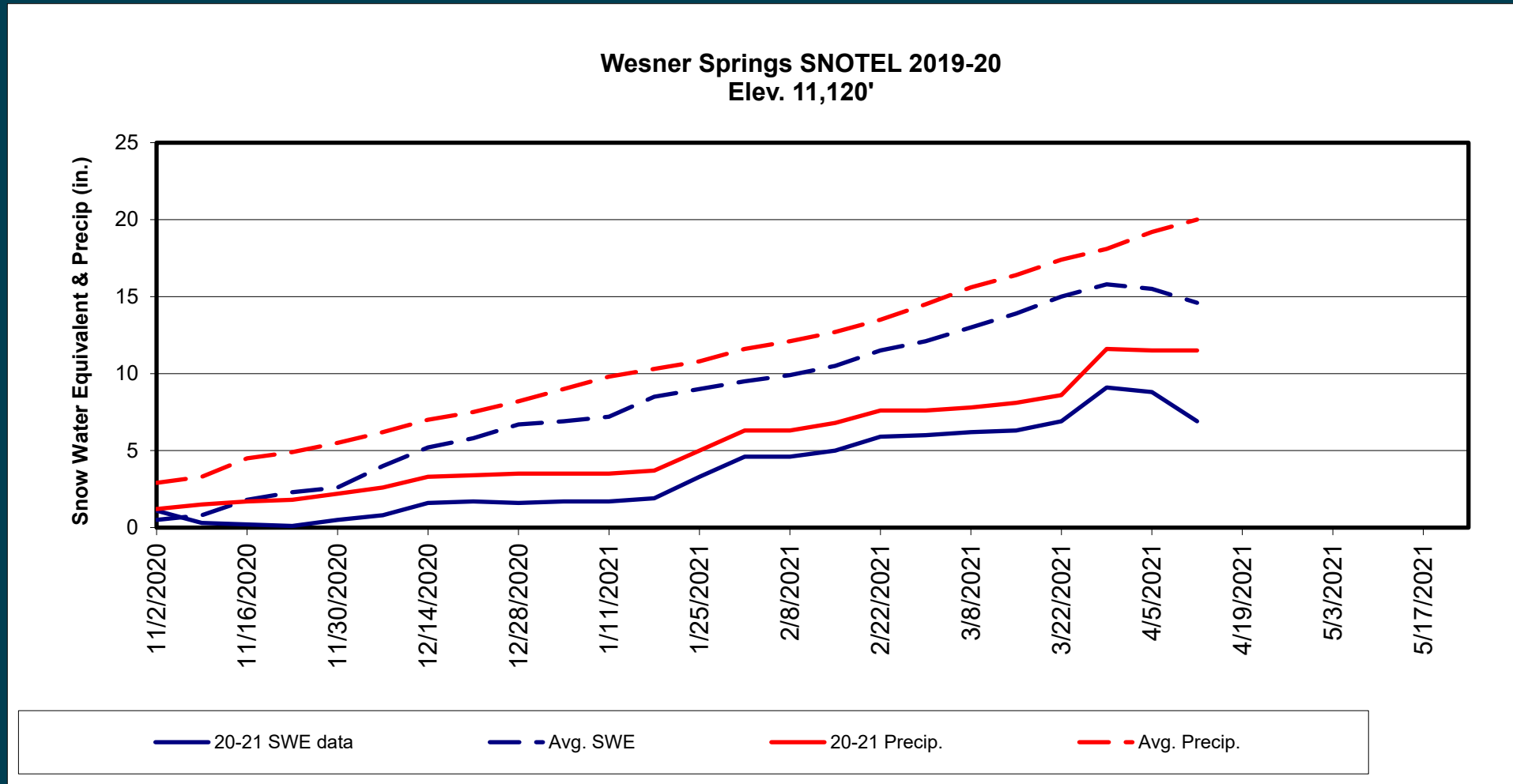


Sangre de Cristo Snow Data

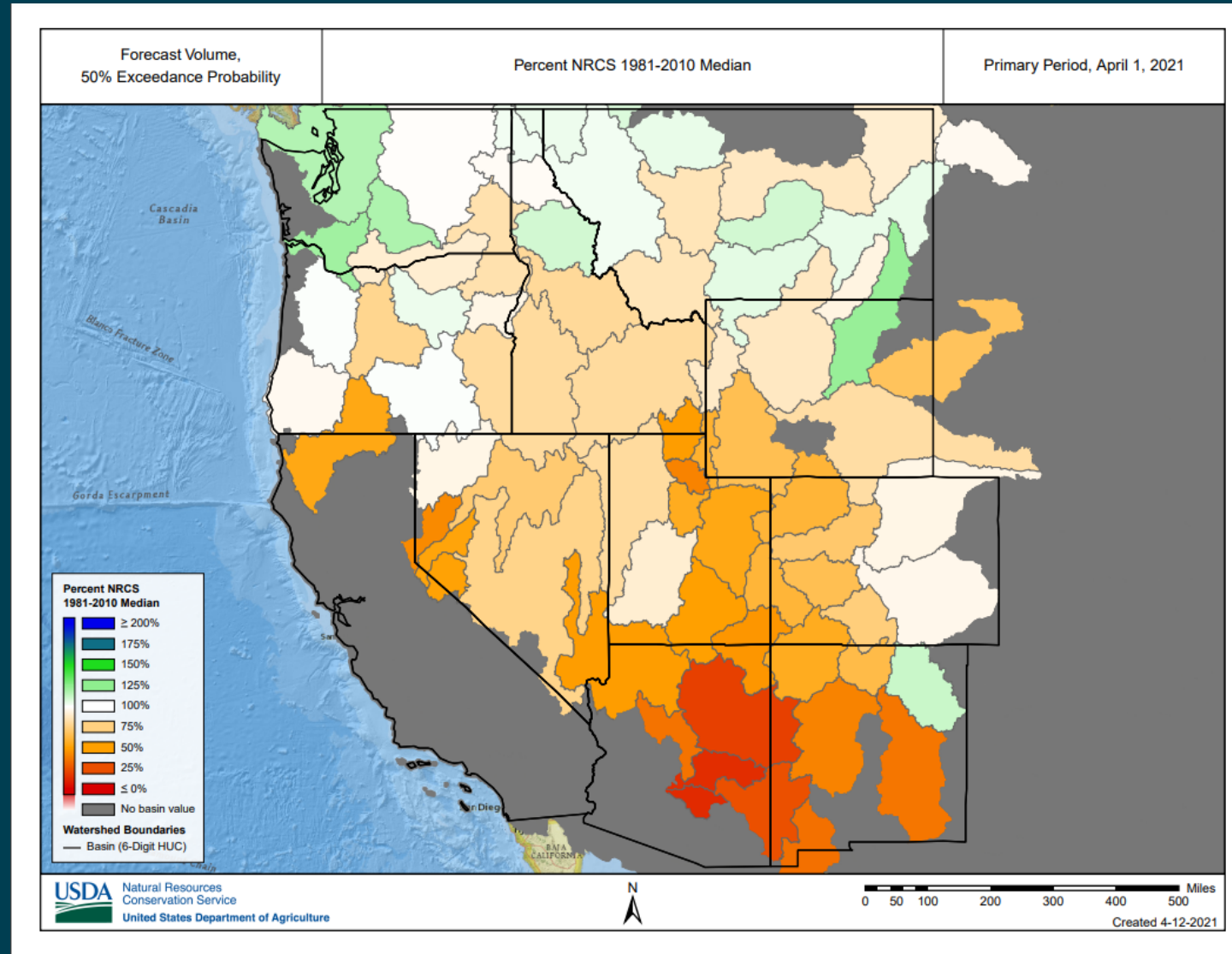


Sangre de Cristo Snow Data

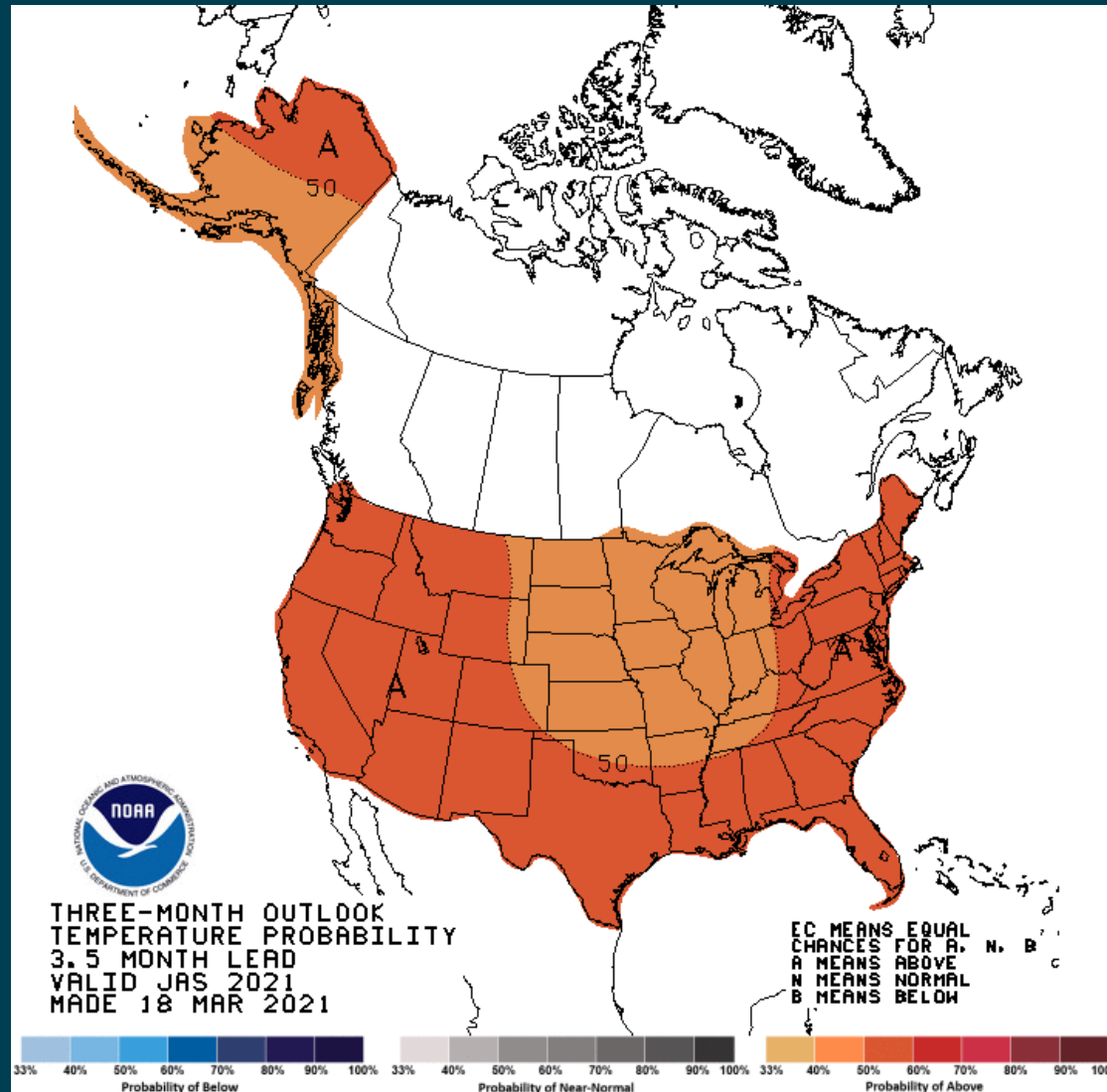
(continued)



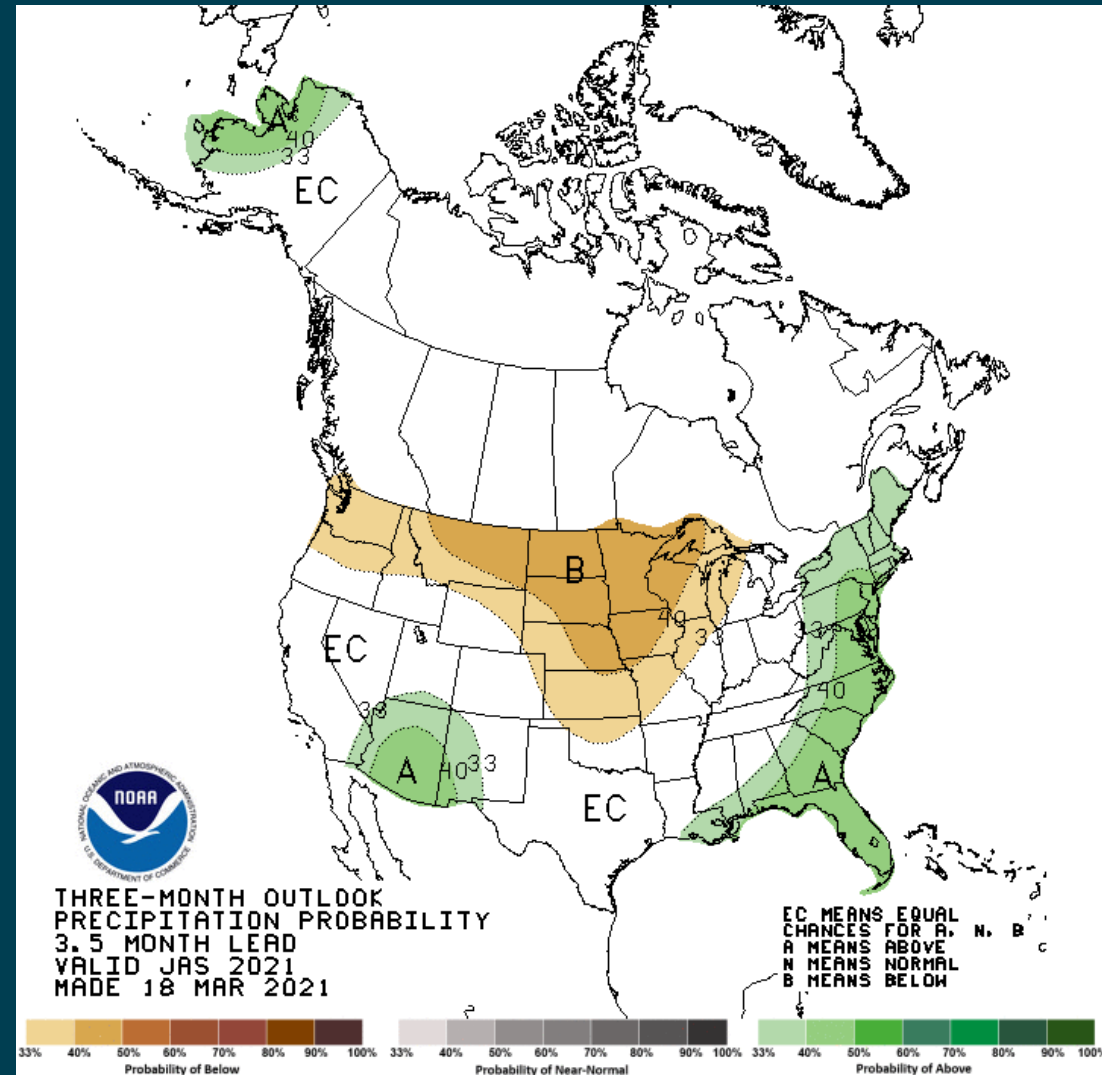
Western U.S. River Basin Streamflow Forecast



Monsoon Season Temperature Outlook



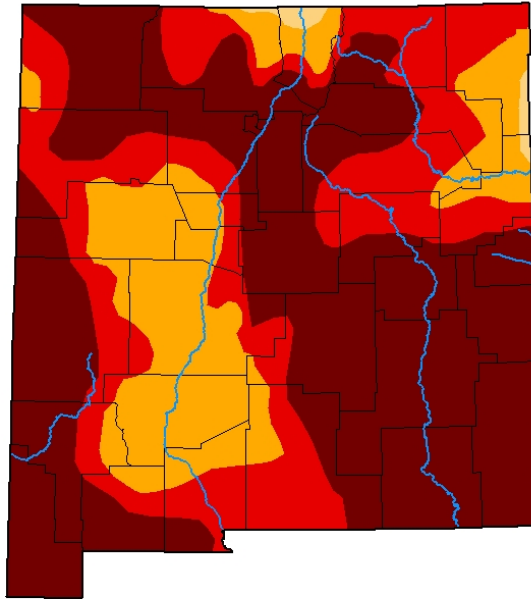
Monsoon Season Precipitation Outlook



U.S. Drought Monitor – New Mexico

U.S. Drought Monitor New Mexico

April 6, 2021
(Released Thursday, Apr. 8, 2021)
Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

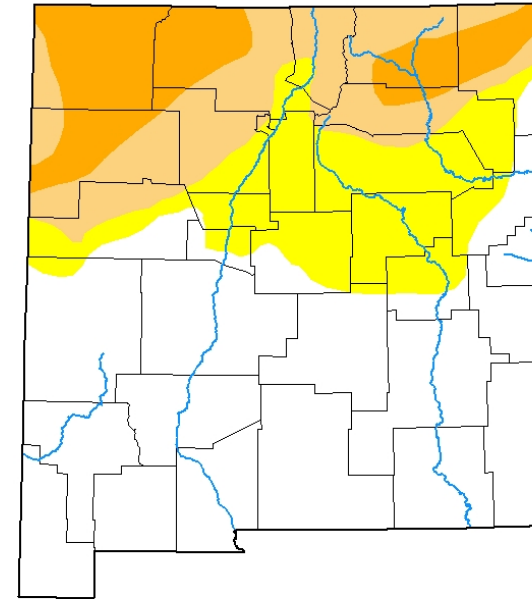
Deborah Bathke
National Drought Mitigation Center



droughtmonitor.unl.edu

U.S. Drought Monitor New Mexico

March 31, 2020
(Released Thursday, Apr. 2, 2020)
Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:

David Simeral
Western Regional Climate Center



droughtmonitor.unl.edu



2021 Water Operations Modeling



Major Assumptions, Input, and Results

- April 1st 70% exceedance forecast
- Storage of water for Prior & Paramount lands
- Article VII restrictions all year
- No native storage for MRGCD nor release of SJCP water
- MRGCD started irrigation April 1, using reduced demand curve
- Irrigation limited to P&P in late July or August
- Reclamation has ~1,200 ac-ft supplemental water, expects additional ~12,000 depending on SJCP shortage

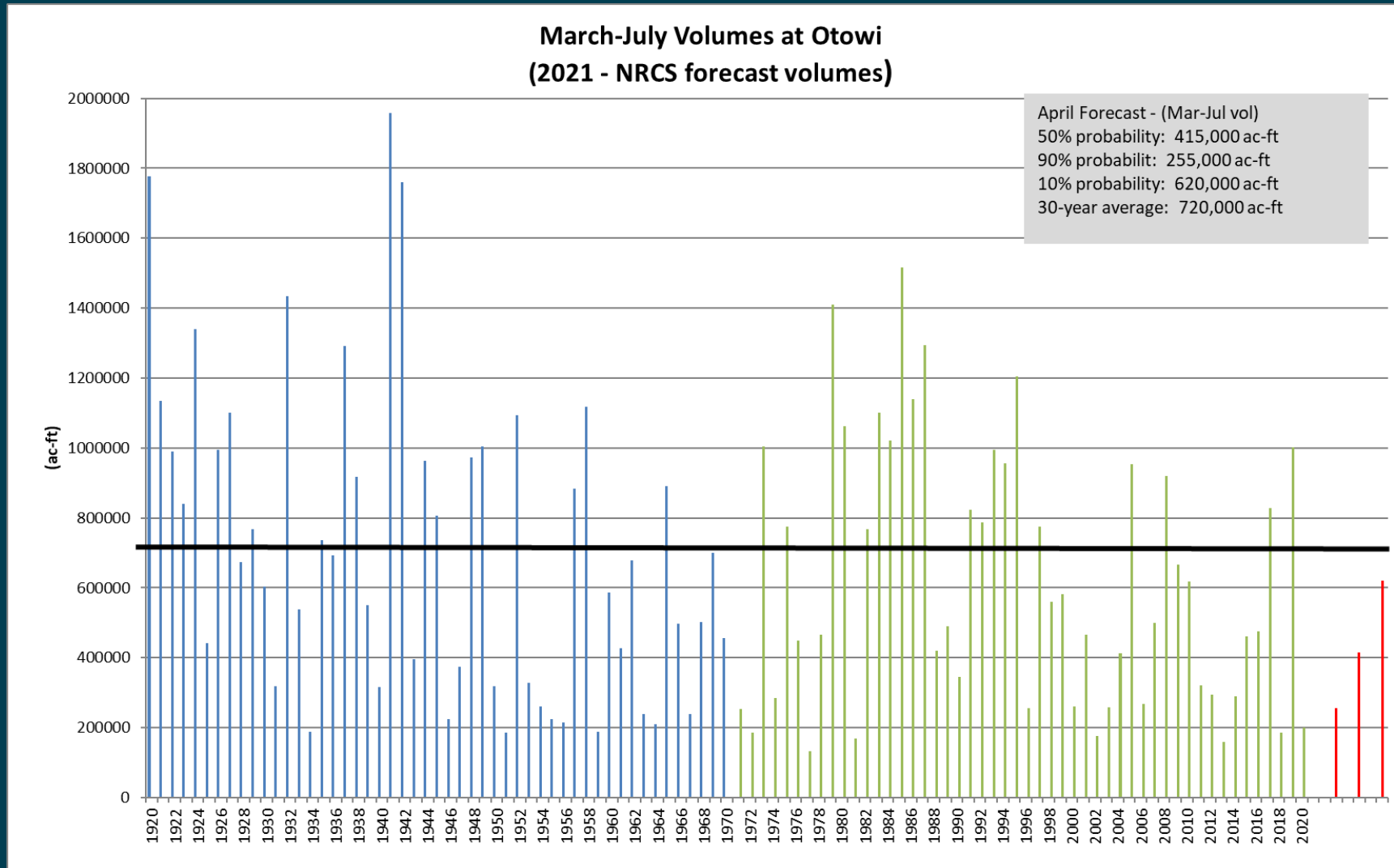


April Forecast Data

| | Most Probable Percent of Average | | April 1 50% / 70% Probability Volume, ac-ft |
|--------------------------|----------------------------------|------|---|
| | 2020 | 2021 | 2021 |
| Rio Grande nr Del Norte | 69% | 71% | 365,000 / 310,000 |
| El Vado Reservoir Inflow | 56% | 52% | 116,000 / 97,000 |
| Rio Grande at Otowi | 53% | 58% | 415,000 / 345,000 |
| Nambe Reservoir Inflow | 77% | 43% | 2,800 / 2,100 |
| Jemez blw Jemez Dam | 39% | 18% | 6,200 / 4,000 |
| Rio Blanco @ Diversion | 65% | 74% | 40,000 / 35,000 |
| Navajo River @ Diversion | 62% | 69% | 45,000 / 39,000 |



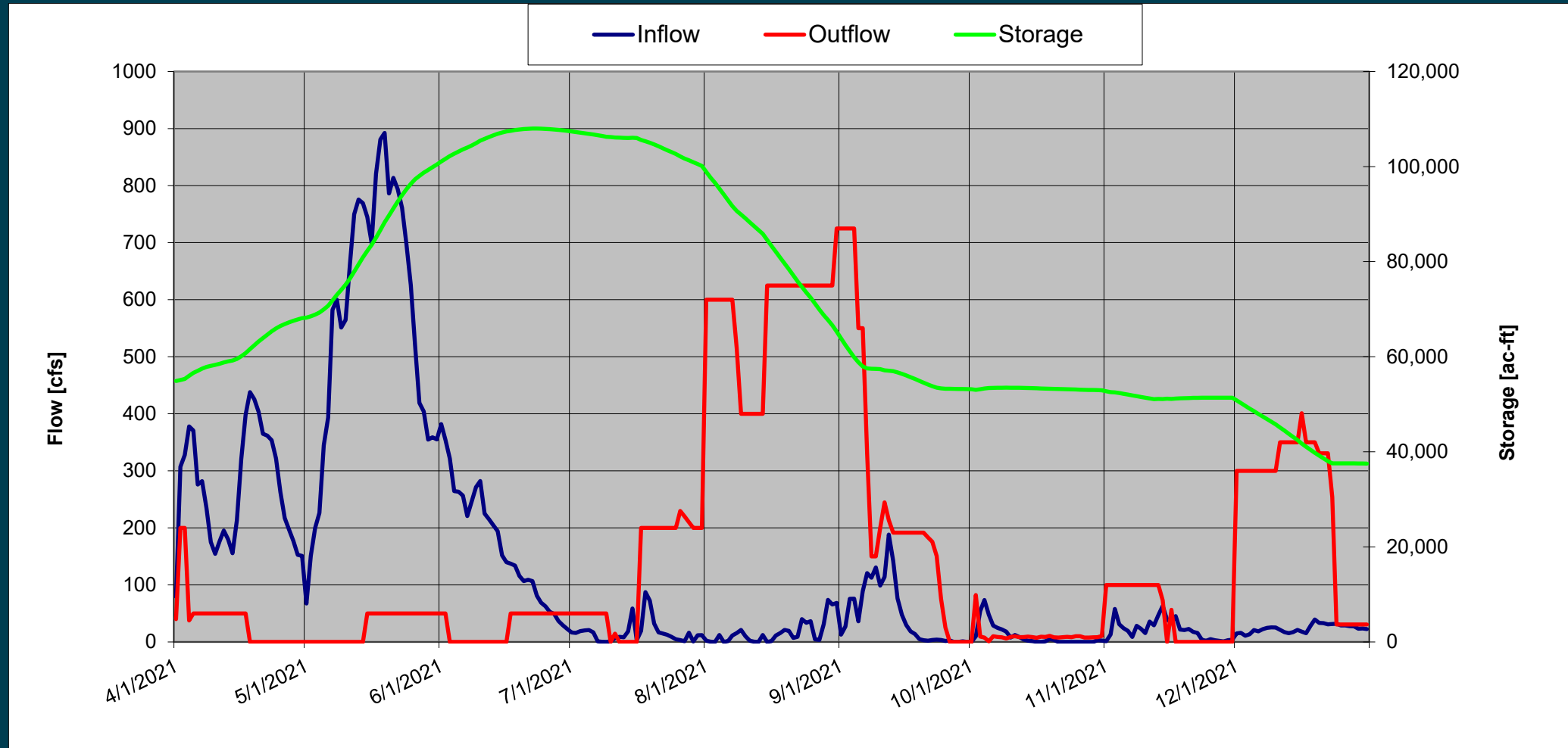
Historic Mar-Jul Flow Volumes at Otowi



Heron Reservoir



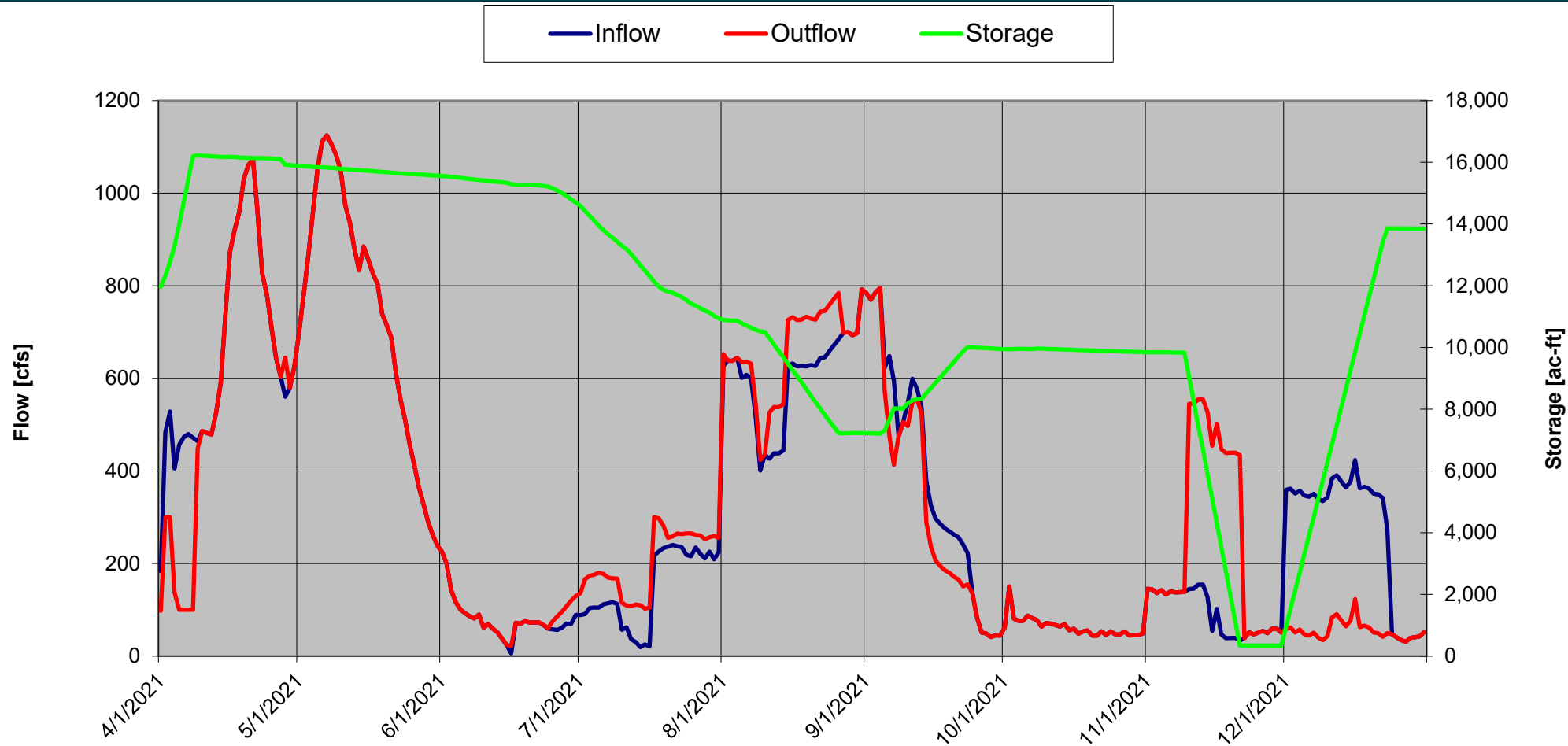
Proposed 2021 Heron Operations



El Vado Reservoir



Proposed 2021 El Vado Operations



El Vado Dam Construction Update

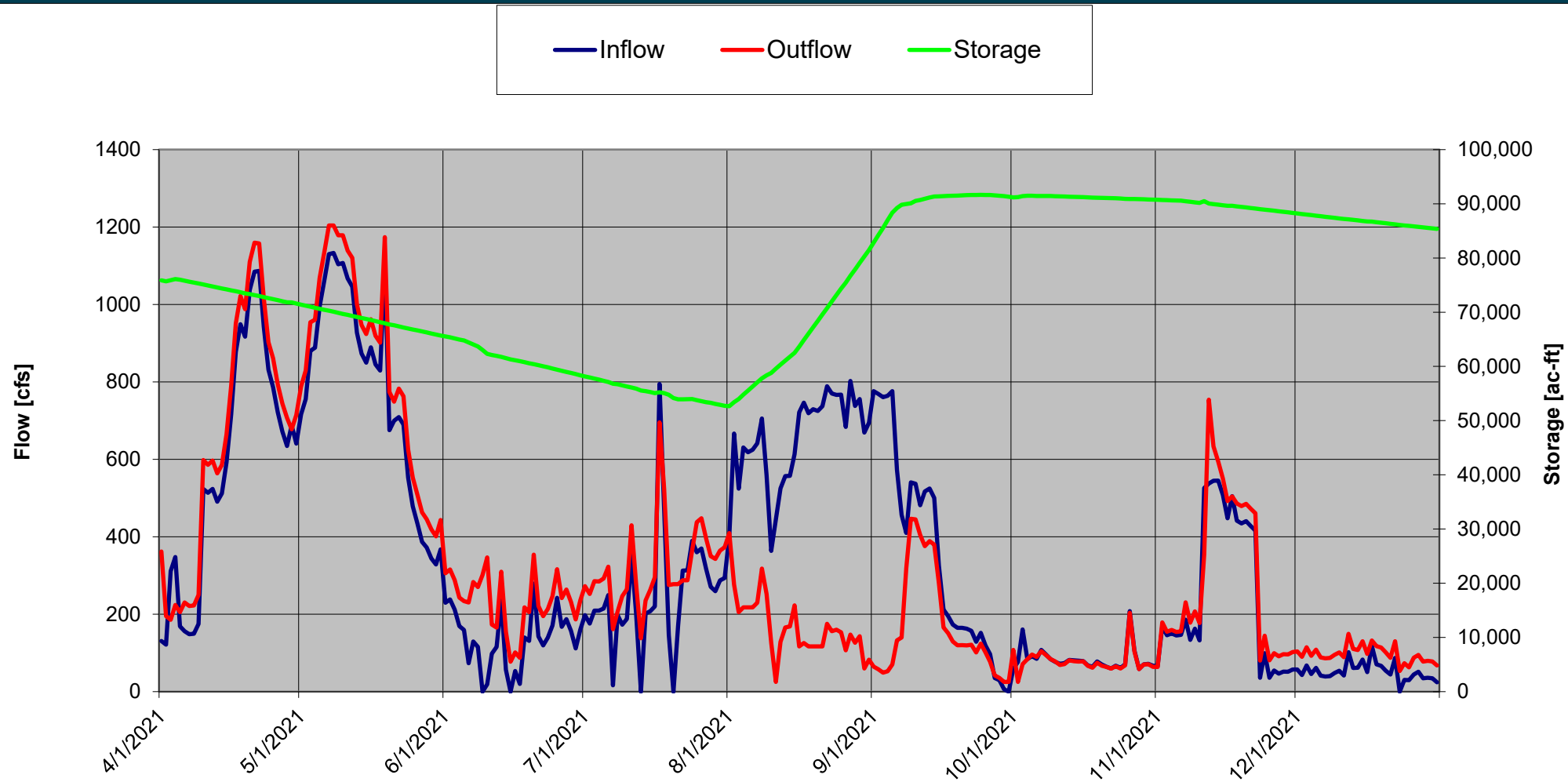
- On track to begin construction in 2022 with installation of geomembrane over steel faceplates and grouting inside dam
- Currently finishing final designs and final contracting steps
- Reclamation will attempt to maintain water operations to extent possible during three years of construction
- Reclamation not considering modifications to inlet tower as they do not align with Safety of Dams project



Abiquiu Lake



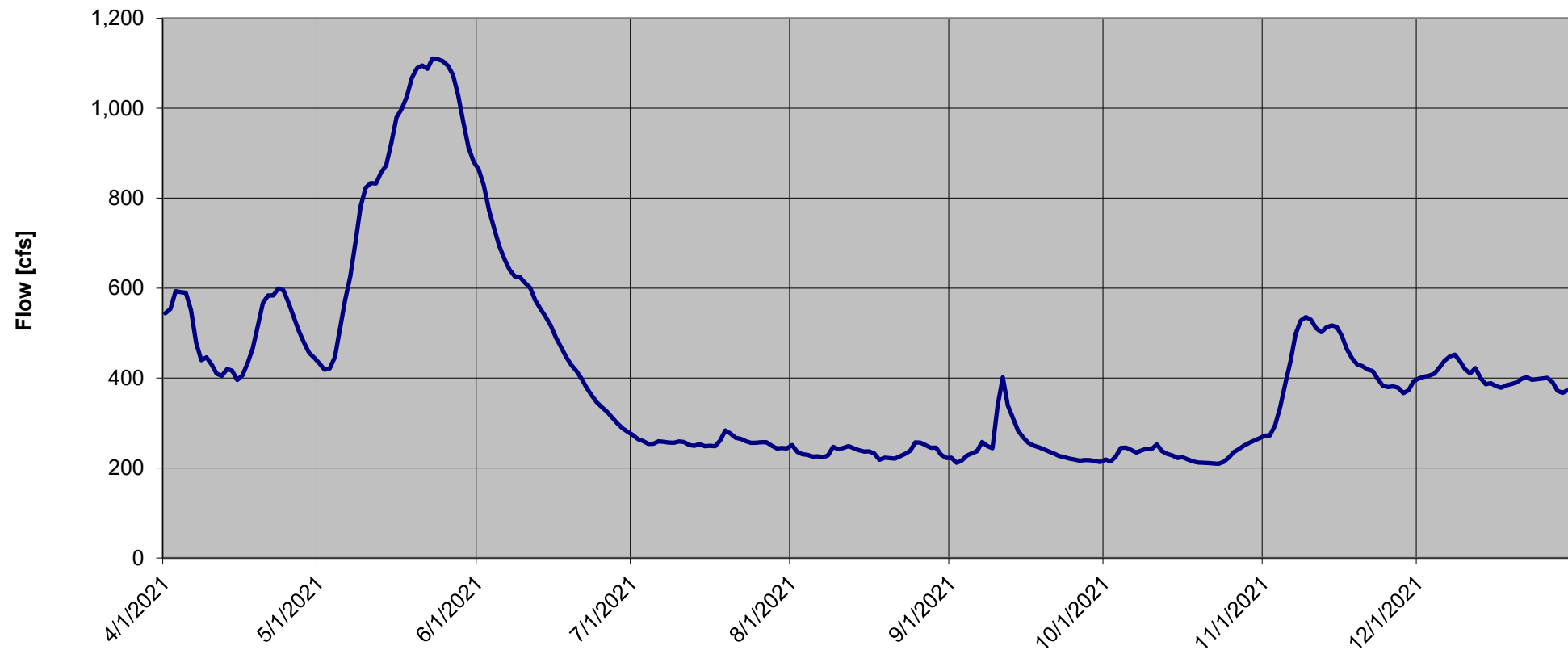
Proposed 2021 Abiquiu Operations



Estimated Hydrograph at Embudo

Rio Grande main stem

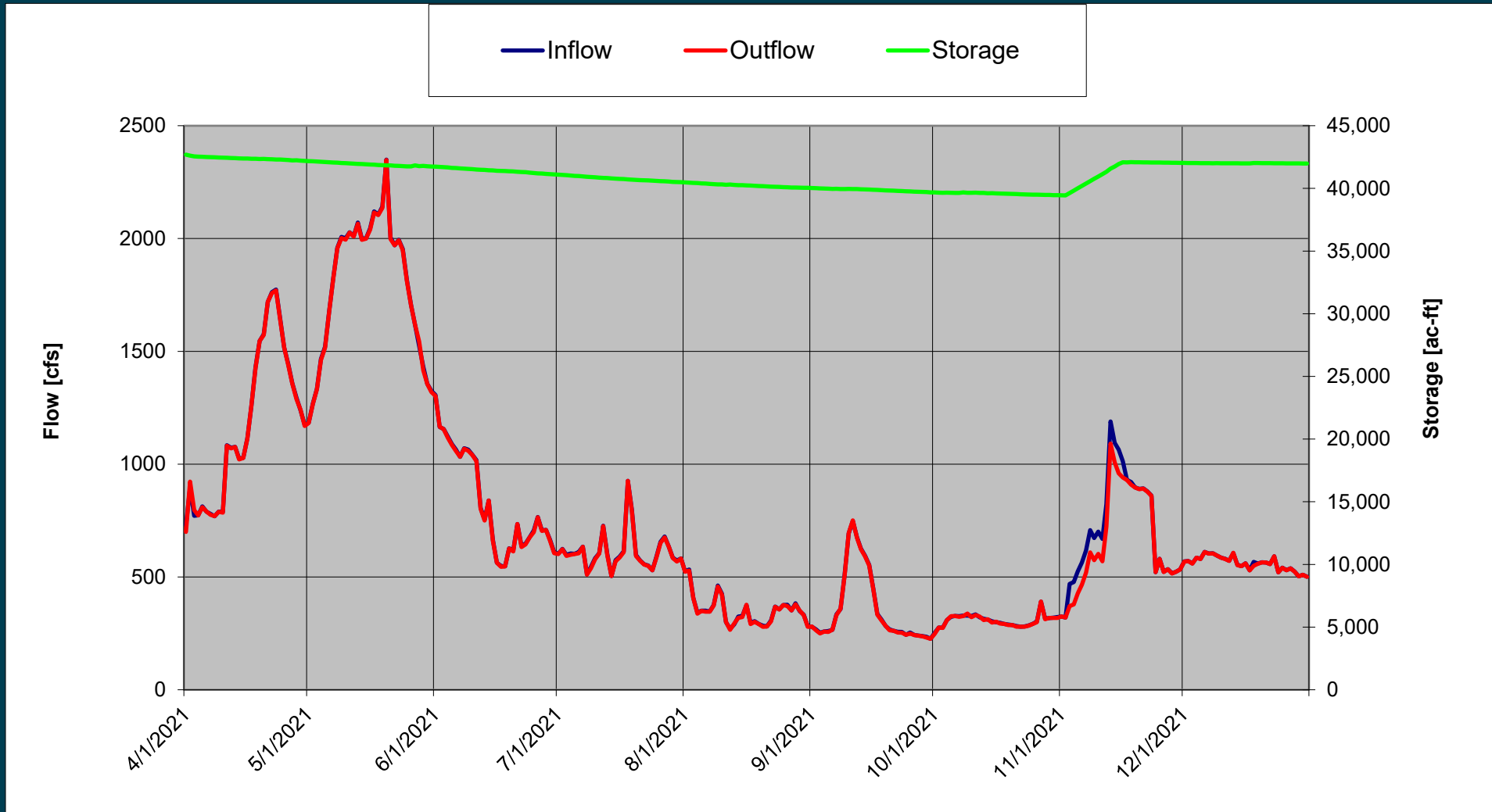
2021 Flow at Embudo



Cochiti Lake

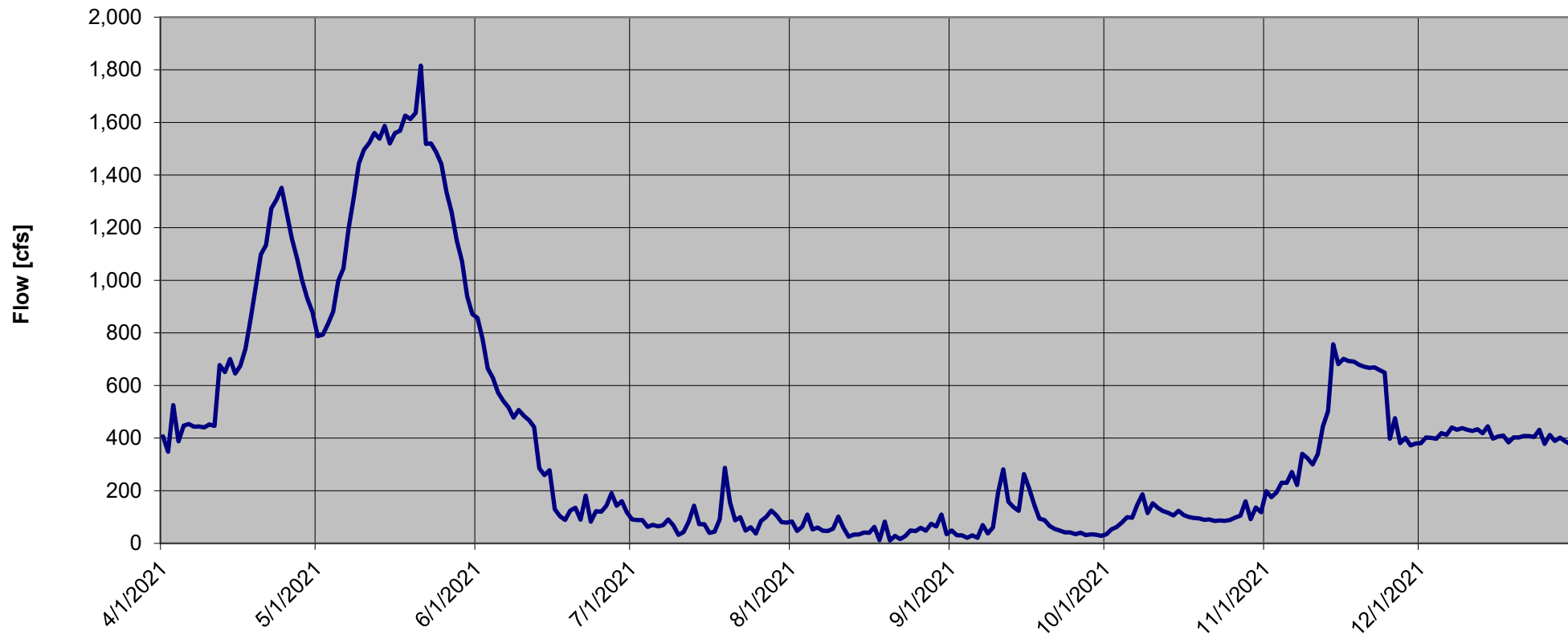


Proposed 2021 Cochiti Operations



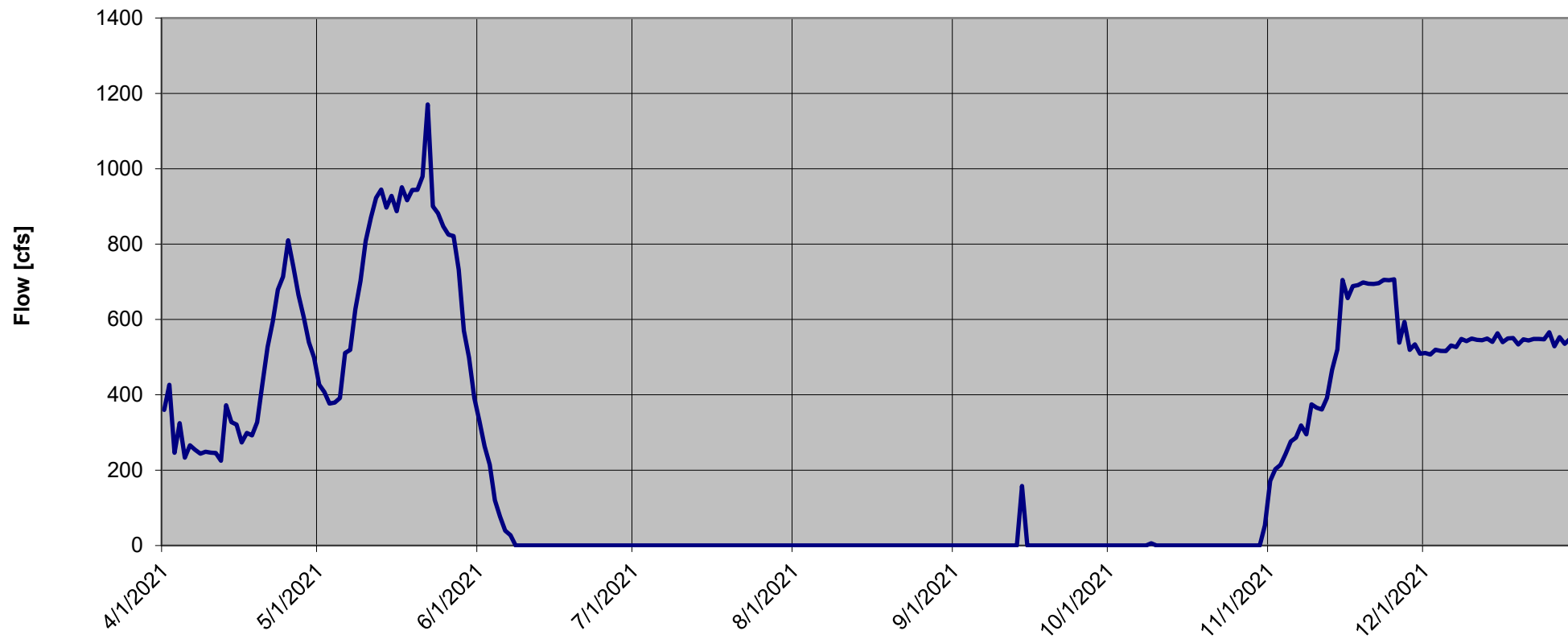
Estimated Hydrograph at Central

2021 Flow at Central Ave Gage



Estimated Hydrograph at San Acacia

2021 Flow at San Acacia Gage



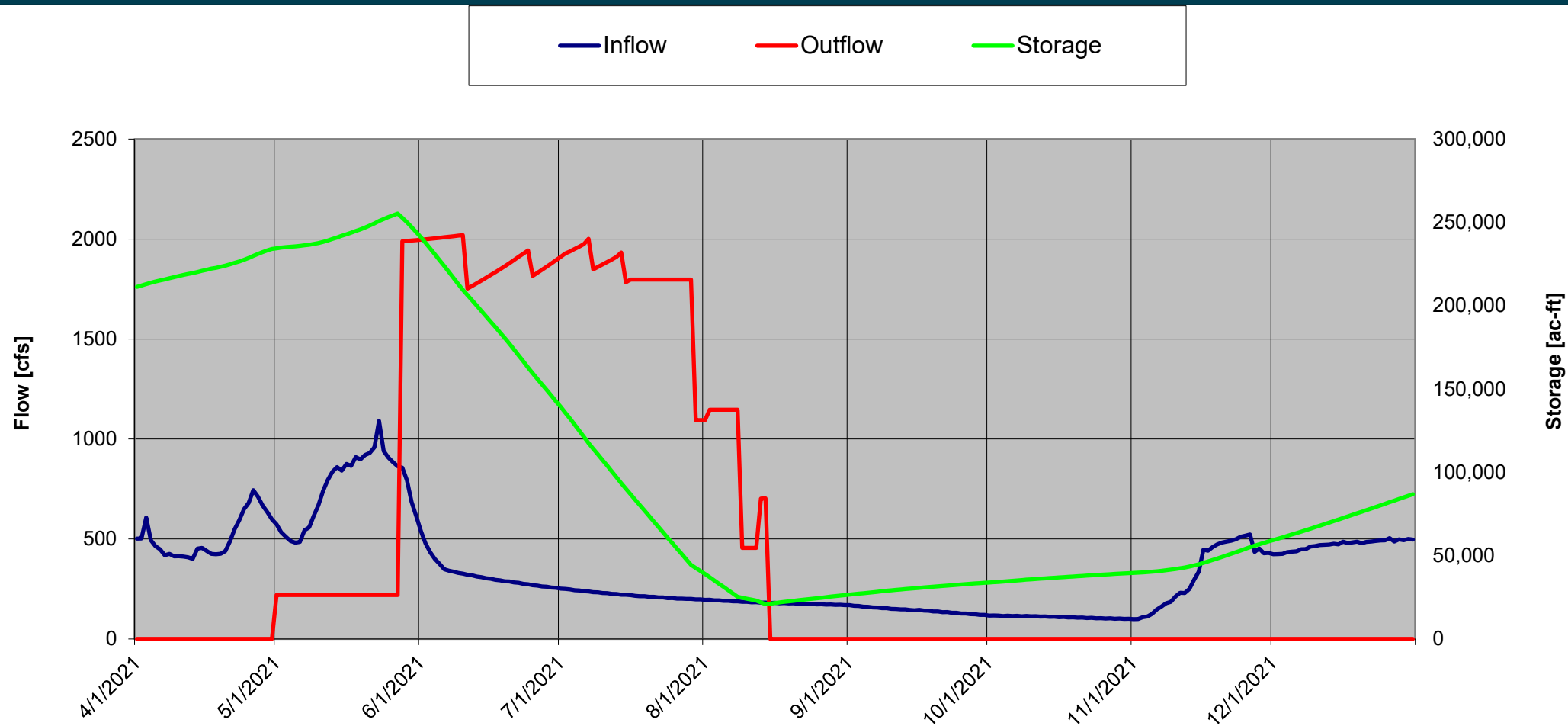
2021 Rio Grande Project Operations



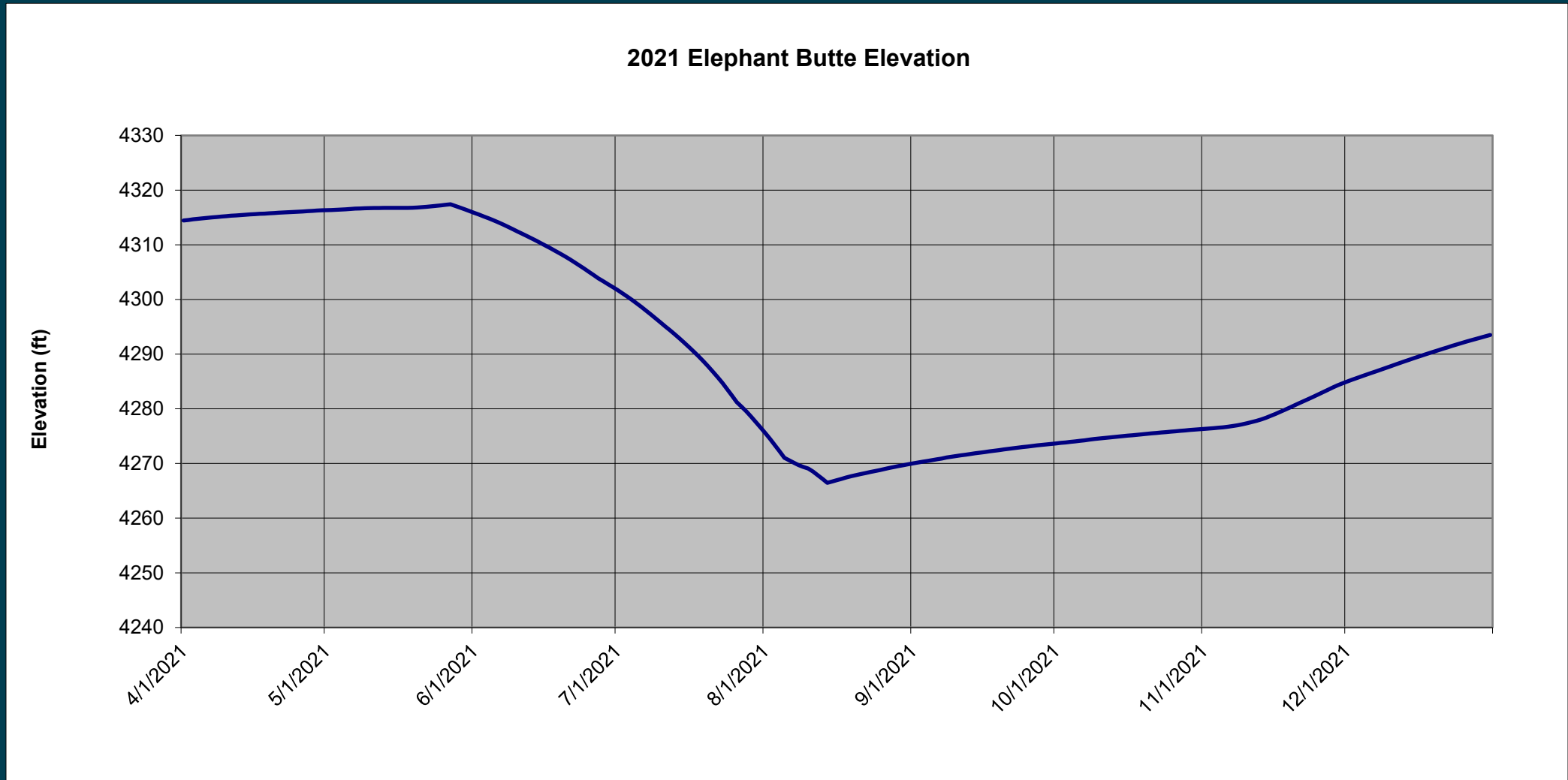
Elephant Butte Dam



Proposed Elephant Butte Operations



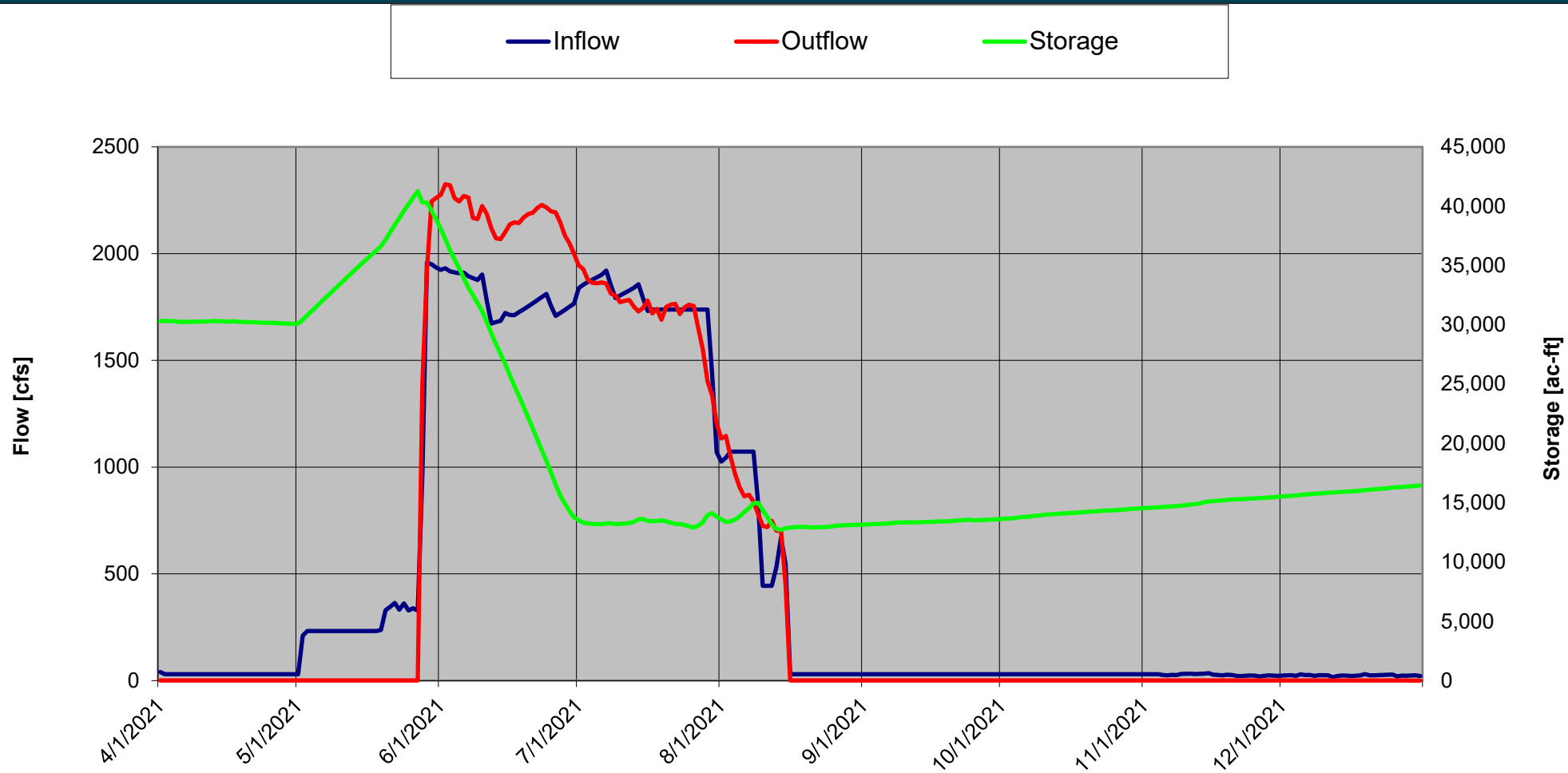
Elephant Butte Projected Levels



Caballo Dam

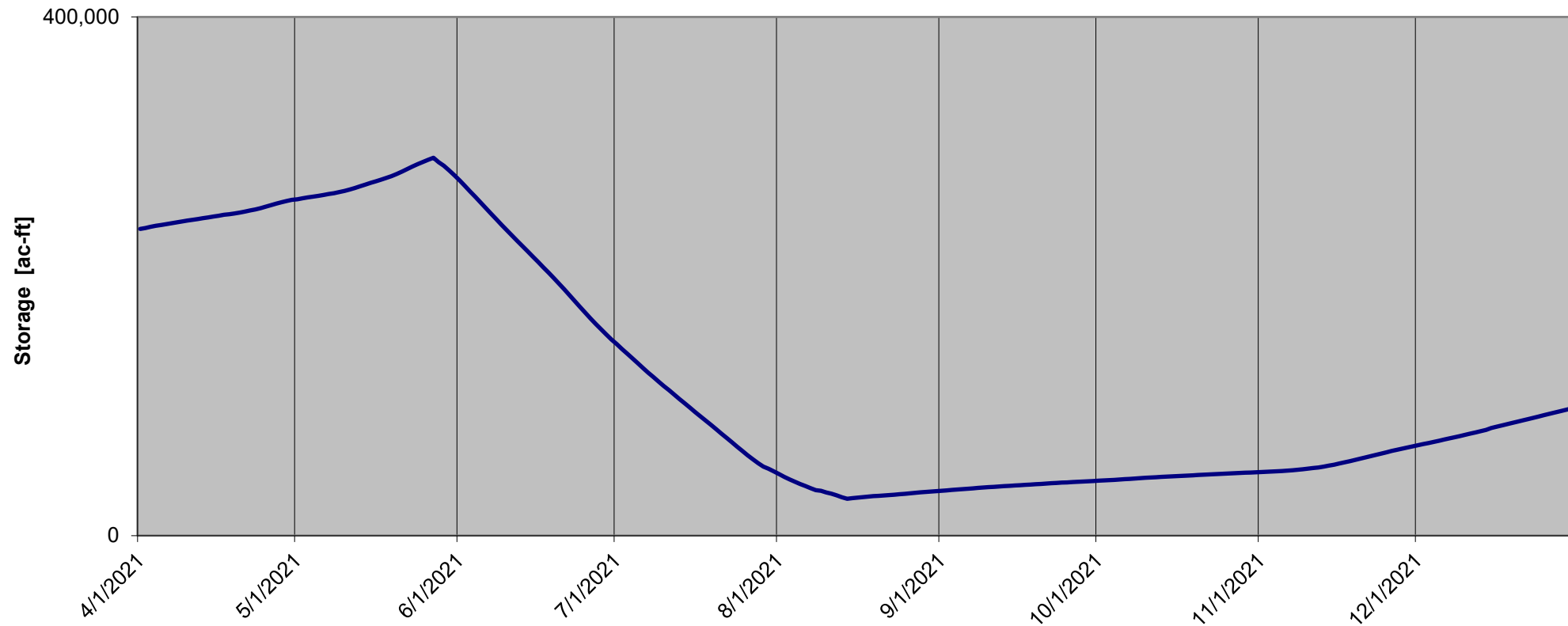


Proposed Caballo Operations



Article VII Restrictions: In or Out?

2021 Rio Grande Project Usable Storage



Questions / Comments

<https://www.usbr.gov/uc/albuq/water/aop/index.html>



— BUREAU OF —
RECLAMATION